# The Builder.

*SATURDAY, APRIL 8, 1854.*

RESUMING our glance at steam naval architecture, let us now pay a visit to Messrs. Penn's large manufactory at Greenwich, where we find that the operations are in variety almost a duplicate of what we have already noticed at Messrs. Maudslay's. The latter being engaged more exclusively upon the largest class of engines, use a greater number of the heavier class of tools. Messrs. Penn employ at present about 700 men. They are distinguished for excellence in marine mechanism, and must be especially familiar to some sections of the London world by the beautiful and compact oscillating engines employed in many of the river boats. Their shops may be subdivided almost in the same manner as Messrs. Maudslay's, and in both we see employed those unique tools, the invention and manufacture of Mr. Joseph Whitworth, of Manchester. When we visited Messrs. Penn's establishment, we observed many castings of screw propellers lying about, and some of very large size were being turned out to receive the shaft. This is indicative of the growing popularity of the screw over the paddle.

In all marine engines economy of space is a prime requisite. The paddle and the screw require different adaptations of steam power to develop their respective advantages, and Messrs. Maudslay hold many patents for these adaptations. For the paddle they have feathering floats, direct-acting double cylinder engines, and direct-acting annular cylinder engines. By the way, we may explain the term *direct-acting*. It means that the piston-rod of the engine acts directly upon the crank of the paddle-wheel or screw without the intervention of any beam. This saves room, weight, and friction.

For the screw propeller there are horizontal direct-acting steam-engines, constructed to occupy little space, and to be altogether below the water-line. Then for shallow river navigation there is the direct-acting double piston-rod marine steam-engine. There are also the marine beam engines, largely used in the royal navy, but now being succeeded by the oscillating cylinder.

Messrs. Penn are great, too, in the oscillating engine. They hold a patent also for another improvement called the "trunk" engine, which is especially applied to the screw propeller. The peculiarity of this construction is, that the piston-rod is widened into a hollow cylinder called the trunk. It projects through both ends of the steam cylinder, and has the connecting-rod joined to its centre. In that position the width of the trunk allows it to play at every stroke, and the stuffing-boxes serve as guides. Although there are some drawbacks attendant on this plan, yet it does away with some expensive parts of the ordinary mechanism, and effects a great economy of space.

The reader curious in the details of all these varieties must be referred to Mr. Weale's works. Here we may just allude to what has been found by experiment most advantageous for the screw propeller: "Direct action from the engine to the screw shaft; the cylinders to be short but of large diameter; and air-pumps to be worked by another crank or eccentric on the engine-shaft, of short throw, but very large diameter."

One most important modification of the use of the screw is the power we possess of using it as an *auxiliary*. "It rests," says Mr. Dodd, "upon the principle that during a favourable wind a ship shall progress by means of her sails, but that when bad weather sets in, a screw and a steam-engine shall set to work and render good service at a time when the poor ship would be otherwise beating about at the mercy of adverse winds, or else absolutely powerless in a dead calm. A vessel so constructed has a screw and engine skilfully placed so as to be out of the way when not wanted, and yet quickly available in time of need: the quantity of fuel carried is but small, while the spare room for cargo is much larger than in any ordinary steamers. Our merchant ships, our war ships, our Arctic exploring ships are now giving indications that the auxiliary screw principle is rising rapidly in favour. Indeed, it is evident that there are many sources of advantage here in store; for it is optional to the commander to employ steam power just when and as often as he may choose or his stock of coals may admit. He has wind to appeal to if short of coals; he has coals at command if ill provided with wind.

Mr. Joseph Maudslay holds a patent for a propeller of this description, which we describe briefly in his own words:—"It is so constructed that the blades can be turned fore and aft from their proper position for propelling, and thus assume a line with the keel of the ship, so that, when steam power is not used, and the vessel is put under canvass alone, no necessity exists for taking the propeller out of the water, as the blade will not offer any resistance to the progress of the ship. We subjoin some curious statistics bearing on the subject, from the source we have already indicated.

"Let us imagine that a bird's-eye glance could be taken at the surface of Europe, in relation simply to the steam-ships which have been mainly established for post-office service. We should see the steamers of twelve companies, forming an unparalleled fleet of a hundred splendid ships, employed by the English Government alone. These ships (it has been lately stated) have cost not less than 3,000,000*l.*; they have 30,000 horse power of engines, and 80,000 tons burden. They traverse 2,000,000 miles of ocean in a year, and their owners receive 750,000*l.* per annum from the British Government for postal service. Southampton is the packet station for nearly one-half of these fine steamers; and the three companies which make it their depôt, receive much more than one-half of this large sum. If we watch these hundred steamers, careering over seas and oceans, we find that they touch at most of the great ports in both hemispheres; they carry not only British letters to foreign countries, and foreign letters to the British dominions, but also foreign letters to other foreign countries. France, Denmark, Spain, Holland, all have colonies separated from the mother country by the broad Atlantic; but none of these use their own steamers to perform the mail service to those colonies; it is either effected by sailing vessels, or by the English mail steamers, the latter being the method now adopted more extensively year after year." The West-India Company take such mails to the colonies lying contiguous to America; the Peninsular and Oriental Company convey those bound eastward; and in such cases the mail-bags from foreign countries are either brought to Southampton, or we pick them up at Cadiz, or some other port.

How strangely does it strike the mind—how subversive of old-time associations—to read such an advertisement as the following:—"Steam communication between Cairo and the First Cataract. The Egyptian Transit Administration begs to inform travellers that a steamer will be despatched from Cairo to Assouan on or about the 10th of every month. * * * * The whole voyage will be accomplished in seventeen or eighteen days, including about 210 hours' stoppages at all the places where the principal antiquities exist." Napoleon talked to his soldiers about forty centuries looking down upon them from the Pyramids; but if the builders of Edfou, and Denderah, and Thebes could "look down" upon a puffing, panting creation of "Penn and Sons," or "Maudslay and Co." rattling audaciously along at the very foot of the sacred temples, the sight would be much more startling than that of an armed host, and more significant of the progress which the last hundredth part of forty centuries has witnessed.

At Glasgow, a million and a half sterling has been expended in forming embankments, building quays, deepening the bed, fixing beacons for twenty miles down the river, providing sheds, and other apparatus to facilitate the loading and unloading of ships; by such means has the Clyde become one of the most wonderful rivers in Britain. On its banks are to be found the works of Robert Napier, of Tod and Macgregor, of Caird, of Wood, and of other firms whose names are connected with the progress of modern navigation.

"If we glance at Liverpool instead of Glasgow, the shipping phenomena are still more astonishing. Here we find a range of docks more than four miles in length; in which there are sometimes as many as 800 ships moored at one time, and the construction of which cost twelve millions sterling. Liverpool is now the greatest port in the world, in respect to the value of its exports, and the extent of its foreign commerce generally. New York, the first city in the United States, is more populous, but its commerce does not equal that of Liverpool. The shipping trade is rather less than that of London, but the exports amount to a greater annual value. These amounted in 1850 to the almost incredible sum of 35,000,000*l.* much more than one-half of the whole exports of the whole United Kingdom."

## THE TUBULAR AND BRICK SEWER QUESTION.

THE consideration of the drainage question was resumed at the Institute of Architects on the 3rd instant, occupied the whole evening, and was ultimately adjourned. We shall give some particulars next week. Mr. Bazalgette, the engineer of the present sewers' commission, who opened the matter on that evening, took upon himself to make some observations upon the course pursued by this journal on the question, in a tone which was both impertinent and offensive. Our readers know perfectly well that we have carefully avoided partizanship in this matter, and were never able to fall in with the views of those who advocated the minimum size for drains and sewers, although we saw too clearly the value of pipe drains, the evils attending the old system, and the importance of lessening the cost of drainage, not to give all the assistance in our power to the full discussion of the question, with a view to arriving at the truth. The example which the engineer to the Commission gave of our erroneous statements, was the paragraph in our last number as to the manufacture of drain pipes. His actual contradiction, however, came to this, that there were 26,900 houses in the metropolis drained with pipes; that of these 20,000 were drained with 6-inch pipes; so that there could not be 15,000 drained with 4-inch pipes; and that he did not believe 250 miles of pipe sewers had been laid in the streets of the metropolis.

The statement in question was made on what we believe to be good authority, and without a particle of feeling on our side in favour of 4-inch pipes,—rather the reverse, indeed. Up to the time of the change of the first Commission, the whole of the house-drains put down, we are told, were 4-inch, and it was on the authority of one of their own surveyors that it was stated that full two-thirds of the house-drains since used were also 4-inch drains. Mr. Bazalgette's mode of proceeding on Monday night would not lead us to take his statement in preference. The general lengths of the sewers produced

were stated in the estimate of the Messrs. Doulton, who themselves estimate that they manufacture one-fifth of the pipe-sewers made throughout the country: and they manufacture at the rate of ten miles of sewer a week. The estimate was exclusive of the red-ware pipe used,—used rather extensively with fire-brick pipe in the north. The objector may soon settle any inexactitude in the *estimate* made on the authority of respectable makers, by giving a return of the lengths of all the pipe-sewers, private as well as public, laid down in the metropolis; and all the houses drained with pipe-sewers of different sizes; distinguishing all the houses which had been back-drained, and the dates when they had been put down; and the total expenses of all the replacements and stoppages as *compared with the expenses of cleansing and replacing equal lengths of brick sewers*, large enough for men to enter, and the average expense of repairing and cleansing brick house drains, as returned, upon house-to-house inquiries, in eight parishes.

Some of Mr. Bazalgette's statements, denying that the old sewers were in the condition represented in official blue-books, went to impute perjury to a number of persons, and ought to be inquired into.

We have been blamed, by implication, in several journals, for asserting that a fresh epidemic, caused by the leakage of the drains, had broken out at Croydon, and are asked to say that the town is perfectly healthy.* The statement in question was not ours: it formed part of the paper read by Mr. Boulnois at the Institute, and printed in our columns, and for which we are no more responsible than the *Times* is for the statements daily published under the head of parliamentary intelligence.

## TOTTENHAM.

OBSERVING in your journal for last week, a report of a paper read at the Royal Institute of British Architects, by Mr. W. A. Boulnois, upon "the Drainage of Buildings and Streets in the Metropolis," in which the following paragraph occurs, viz.:—"One of the places most insisted upon as an experimental proof of the efficacy of the pipe-drainage, is Tottenham,—now there is a portion of Tottenham, lately called Marsh-lane, but now Northumberland-park, where the system of the Board of Health has been most efficiently carried out by Mr. Pilbrow; the houses are well drained, but the subsoil drainage not being provided for, the basements, after heavy rains, stand in water. The year before last, the water rose in the basements of some, which I had occasion to visit, 18 inches, and had so saturated the walls as to injure them permanently. Had the drainage been according to the system of the Metropolitan Commissioners of Sewers, this most serious evil would have been avoided, and the house-drainage equally good. I am aware that a sufficient fall could only have been obtained at a great distance, and that the present system is the only one the place could yet pay for; but it affords a strong proof of the great gain, which, when there is an opportunity, arises from the combining the subsoil and house-drainage;"—

I shall feel obliged if you will allow me, through the medium of your Journal, to correct any erroneous impressions which such a view of the case might convey to the public, and to explain to Mr. Boulnois very briefly the exact state of the question, as I feel assured that he, not knowing as much of the circumstances and locality as I necessarily do, has given this most undesignedly, but erroneously, as an instance of what he wishes to illustrate.

The facts are these, that the first two pairs of houses built upon the estate mentioned were commenced without giving the legal notice to the Local Board of Health, as required by the Public Health Act: the builder was summoned before the magistrates and convicted: being the first case of the kind, I believe the penalty was mitigated, and my reply, I recollect, when asked what penalty was deserved, was, that the penalty of a tenantless and damp house would be a sufficient punishment. Had the notice been given and plans deposited, in *such* a situation, a basement would not have been *permitted*, and it has not been in the adjoining fourteen houses which the same party has subsequently built.

The locality is little above the surface of the water of the river Lee, and *below* the surface of the upper pond of the navigation. To get a fall sufficient to take the *common* drainage of the *surface*, requires great precision of levels. *Deep* drains were out of the question, as they would have been always filled by the water from the Lee river, which is the only outfall.

The practice here (in the town of Tottenham)—for it is the *town* which has the honour of being quoted as an example, and not this private building estate*—has been to lay the main sewers low enough to drain not only the deepest cellars in the town, but the foundation of the houses, and substrata through which the sewers pass,† leaving the *old* and more *shallow* sewers to carry off the surface-water alone; and with considerable experience in the *pipe*-drainage of towns, I have found no difficulty in doing this, whenever *I considered it advisable*.

I trust, after this explanation, the drainage of the estate alluded to, though being within the district, will not be confounded with the public sewerage of the town of Tottenham.

JAMES PILBROW, Engineer.

## "OUR OPEN SPACES."

IN all matters of political or social grievance, to "write to the *Times*" has become a proverbial remedy, and in all questions relating to metropolitan improvements, I believe, to "write to the *Builder*" will be found to be equally efficacious.

In the last number of your excellent publication, I was somewhat struck with the sympathetic bemoanings of "Respirator" upon the anticipated loss of our "open spaces," reminding one of the mournful complaint of the poor Finsbury apprentice, that "now-a-days there were no more (Moor) fields." "Respirator" feelingly alludes, among other sites, to the open space at the south-east corner of St. Paul's Churchyard, which he states, "by the planning out of the pavement, it appears is again to be blocked up with buildings."

After so noble an opening has been formed, and the colossal façade of a palatial warehouse erected, to block up the open space in front would surely be a public calamity, and one to which I am confident the present eminent City architect would never submit, unless from that all-powerful cause, the vast outlay which it has cost the corporation of London to settle the enormous compensation claims, and the consequent necessity of reimbursement in the shape of ground-rents.

With the City Improvements Committee it must be "their poverty not their will consents" to allow a project to be entertained so totally inconsistent with their calling, and I sincerely trust that the *Builder* will raise its powerful advocacy in preventing so fatal a blot upon the fair fame of a committee who, in their straightforward line in New Cannon-street, have, in a great measure, redeemed the tortuous windings of Gresham-street West.

It is, I believe, generally understood that Messrs. Behrins are to be re-cooped on the south side of the new street, and that the distinguished professor of King's College is to give us a rival façade to that of Messrs. Cooks. Pray, therefore, let the present open space be preserved from warehouse encroachments, and let it be applied to the more noble and suitable purpose as a site for placing a statue to London's great architect, Sir Christopher Wren.

"Si monumentum requiris circumspice"

may be adduced in reply to this appeal, but let the city of London possess the statue as well as the cathedral monument of its great adorner, and instead of joining the Mammonian and utilitarian outcry of removing his sacred edifices, let us embrace the present opportunity of doing some slight measure of justice to that great and good man, and endeavour, if possible, to efface the recollection of that reproachful line, "*While Wren with sorrow to his grave descends.*"

Let a statue of *Wren* be placed on this most appropriate site, in view of his greatest work, and engrave on the pedestal (after the manner of the plan in the Roman Forum) our neglected architect's plan for rebuilding London after the Great Fire, and thus show to posterity what London might have been, had not private interests been allowed to interfere with the public good.

We have statues of royal personages, of our military and naval heroes, and of our distinguished statesmen, why should our great artists, our metropolitan adorners, and benefactors be neglected? and what more fitting time than the present, when our Chief Commissioner of Woods and Works is requesting information respecting the number of our public statues.

Should, unfortunately, the civic exchequer be not sufficiently well stored to meet this debt of gratitude, I feel assured there would be no want of zeal or money contributions to purchase of the City this plot of ground for so legitimate and worthy a purpose.

Our great church dignitaries, from the archbishop and dean to the minor canons,—the Trinity corporation, with our royal patron of the fine arts, Prince Albert, at its head,—the Bank of England, the East-India Company,—our merchant princes and bankers,—the great city companies,—would all most cheerfully respond to your call *con amore* for so noble an object; and though last in my list, not the least to evince their gratitude to Wren, the Royal Institute of British Architects.

A CITIZEN.

## PORTABLE SHOPS AND STORES FOR MELBOURNE.

THE great want in Australia is house-accommodation: a hut in Melbourne commands more rent than a mansion in Park-lane; and it has been estimated that the influx of emigrants to Melbourne alone will probably require annually the erection of 2,000 houses, capable of accommodating five persons each on an average, for the next ten years. All sorts of expedients have been adopted to supply the demand, and a company was established a few months ago with this end in view,—the Melbourne and Colonial House Investment Company. They use various materials, including, we believe, hollow bricks, and arrange so that the houses may be easily erected at their destination.

Mr. Hemming, of Clift House, Bristol, has recently erected for them some sets of shops and stores, with dwellings above, which are about to be sent out to Melbourne. Annexed we give a view of one of these, that our readers may know the shape they take. Each shop or store is 37 feet by 25 feet, fitted up with shelves and mahogany counters, with an apartment at the back, 25 feet by 6 feet. The shop-fronts are of plate-glass. Stairs, with a private door under the colonnade, lead to a sitting-room 16 feet by 12 feet, three good-sized bed-rooms, and various closets on the floor above, protected back and front by a verandah. The lower floor is 12 feet high; the upper floor 11 feet. Each house is supplied with large tanks, to collect all the water from the roofs. The roofs and walls are of galvanized corrugated iron. The lower framework and all the girders are of oak, and the framework of pine. The total length of the building is 100 feet by 49 feet.

We have before now spoken of Mr. Hemming's establishment, and of the portable houses and churches constructed by him.

The houses consist of an iron or timber framing, if of timber 4½ in. by 3 in. or 3-inch square scantling, and sills of oak, or Memel; in storied houses the scantlings are increased in proportion. The walls and roof are of galvanized corrugated iron, the ridge capping of the same material. The walls are lined in the inside with half-inch boarding, covered with canvass, ready for papering, leaving a space of 4½ or 3 inches throughout the entire building between the iron and the wood-work, afterwards to be fitted up with any non-conductor, by which means ventilation is effected, and the temperature in summer much lessened, and increased in winter: this place is adapted for 4½ or 3-inch brick-work. The ceilings are of canvass with felt, ready for papering. The space between the felt and the galvanized roof to be filled up with any non-conductor. The doors are panelled; the sashes glazed, with shutters and fastenings. The whole is put together with iron screws, and completely erected at the works previous to shipment.

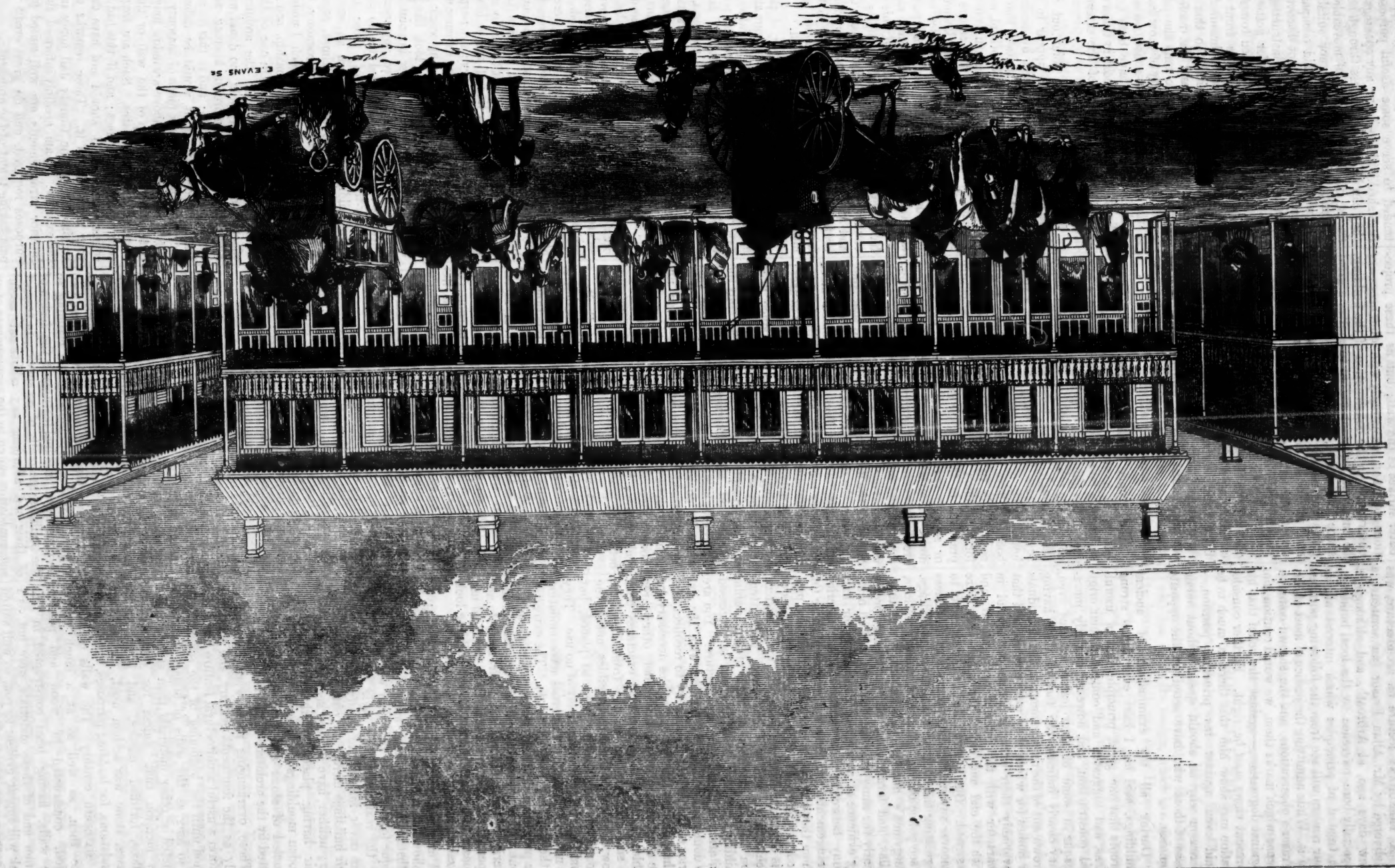
They seem exceedingly well adapted to their purpose, and pack closely for the voyage.

* We have also received a letter from Mr. Wykes, clerk to the Croydon Local Board of Health, which says the statement is untrue, and that for the last twelve months Croydon has been unusually healthy.

* This estate was not included in the public works of sewerage by the Local Board of Health, though the water-supply has since been given, in like manner as to the rest of the district, but the drainage was done at the cost of the proprietor or leaseholder on the estate, and carried to a separate outfall from that of the town, though, of course, according to the plans and under the direction of the board's engineer.

† See Mr. Bazalgette's Report to the Commissioners of Sewers of Tottenham, &c.

SHOPS AND STORES, WITH DWELLINGS ABOVE, FOR MELBOURNE.



## THE WEAKNESSES OF MODERN ARCHITECTS.

A TRENCHANT lecture on architecture, was delivered by Mr. Allan Fraser (an amateur), a few days ago, at Arbroath, and although it specially bore reference to the local buildings, it treated of principles which interest all, as our readers will see from the following portions of it. While admitting the justice of most of Mr. Fraser's observations, and the shrewd common sense which marks them, we would caution him against dogmatism,—against the belief that his present views *must* be right. Further consideration may show him that there is much to be said even against his principal position,—a reason why he should speak without harshness of those who have acted on the opposite opinion.

During all my examination of ancient buildings, said he, I have ever found strong proofs that one great principle, that of usefulness, had suggested and controlled their original construction, and however quaintly picturesque in some of their lesser features even, they clearly indicate the fact of their having grown out of the requirements of the individuals or bodies for whom they were erected, and that invariably their exterior forms correspond in character with the interior arrangement, and with the end and object for which they were designed. But I have failed in my attempts to discover any such leading principle as usefulness regulating the construction of modern buildings. I see police offices, infirmaries, railway stations, clergymen's manses, jails, country mansions, villas, and farmhouses, all possessing pretty nearly the same external features, and all bearing evidence of a want of consistency or harmony between their exterior and interior arrangements, and the requirements of those for whom they have been erected. I shall now proceed to point out a few particular examples of this deviation from ancient practice in modern architecture; and will first direct your attention to the exteriors of such of our public buildings as have been designed in professed imitation of Elizabethan architecture. You are no doubt all sufficiently familiar with the exterior of the Arbroath Infirmary to recollect that it has, besides the two end gables necessary for the construction of its main roof, other three gables placed with geometrical exactness both in size and position on the front elevation. Now, I object to those three gables, not on the ground of their having been so placed, but from their being comparatively of no use. They do not contribute to the internal accommodation in the way they pretend to do. The extent of the projection of these three gables from the front wall is not correspondingly repeated in the interior of the building, and their roofs do not appear there at all, so that their principal use appears to be merely to make the building look Elizabethan.

I must ask you to bear this fact in mind, as it shows what I have already told you, that, notwithstanding their keen appreciation of picturesque forms, those to whom we are indebted for the realities of this style of architecture were never induced to falsify the exterior of their buildings merely to obtain variety of outline; neither have I ever seen an instance of their having placed overhanging roofs and wooden mouldings on houses with walls constructed of stone and lime—a mistake committed by the architect of the Infirmary.

These overhanging roofs were common as early as the fourteenth century, and continued to form a useful architectural feature from that period until the beginning of the seventeenth, or so long as the walls of houses were constructed of other materials than stone; and I may mention that unless for ecclesiastical edifices, fortified castles, and large manor houses, stone was seldom used, further than foundations, for building purposes, even during the sixteenth century. The walls of houses were then, as well as at a much earlier period, constructed of wood and plaster. The walls, having been constructed in this manner and of these materials, were not, as I think will appear evident to you, so well suited for bearing exposure to the weather as those of stone-built houses. Their architects, on that account, designed a protection for the material, by projecting the roof considerably beyond the outer surface of the wall; but as these projections could not, consistently with other necessary observances in the construction of the building, be made of sufficient extent to shelter a great space underneath, the upper portion of the gable was usually made to overhang the lower; and, in houses of more than one story, the upper one in like manner, and for the same reason projected over the under; so that all these projections which give so picturesque a character to those old timber houses, to which overhanging roofs properly belong, were not, as I trust will now seem obvious to you, designed for ornament only, but for the purpose of protecting the materials of which they were constructed, at same time adding considerably to the interior accommodation. * * *

The proper finish for walls of stone-built houses is a stone cope, moulded and made sufficiently broad to project over the outer surface of the gable wall. When I say that a stone cope is the proper finish for the gable, I mean that although I have been on the look-out for several years for an early example of a stone house with an overhanging roof and gable-boards, I have as yet failed to find one. I will now allude to another unnecessary display of form common to every style of architecture practised in this county during the past sixty or seventy years—I mean false or mock windows. You will not find, on houses that were erected previous to the time when the window-tax was first imposed, any instance of a dumb window having formed a feature of the original design of the building; but ever since that time, and when the daylight was shut out from these old houses, our architects have copied those compulsory mutilations, and placed them as unmeaning blemishes on the faces of our houses; and I can only account to you for the practice by supposing that they have ever since been actuated by an excess of the imitative faculties such as prompted the Chinese tailor to copy the patches on his pattern-garment,—with this difference, however, in favour of the tailor, that while he copied correctly the blemishes, they have increased their number; for it is no uncommon sight to see more mock windows in a modern three-storied house than there were of real windows in any building of the same size before the practice began.

The next building to which I shall direct your attention as an illustration of the existing inconsistencies in modern architecture, is the new infirmary now in course of erection in Dundee. But I must first remark, that proof is afforded in this building of a want of inventive talent amongst architects of the present day. On an appeal to the whole country for designs for a building suited to the purposes of an infirmary, the best produced, at least declared to be so by the unanimous voice of the committee appointed to decide on their merits, is merely an imitation of an English baronial residence of the sixteenth century, and not intended to be carried out in the interior consistently with its exterior form. Those of you who have seen this building will have little difficulty in recollecting that, besides the two long octagonal towers in front, and the usual profusion of gables common to the style, it has two large pretentious towers, one on each of the two sides of the main building. Now, in really old Elizabethan houses, towers were not erected for ornament merely, but were considered necessary additions to the internal accommodation required by the usages and mode of living at that period, and, when finished with flat roofs and parapet walls, as these are, were always provided with stairs, to enable the occupiers of the mansion to avail themselves of the outlook afforded, either for the purposes of defence, or for other uses requiring a satisfactory view of the amusements or exercises going on below. Now, these two towers, standing so prominent, and claiming to be considered principal features in the design of the building, are really of no service, in respect of their not affording any additional useful accommodation suited to the requirements of an infirmary. They are four stories in height. The three first merely serve to prolong the passages beyond where any passage is required, and the fourth storeys, although apparently intended to serve some useful purpose, are not furnished with doors or any openings by which they can be entered, unless through holes in the floors, reached by means of moveable traps or ladders, neither very safe nor suitable stairs, you will admit, for the invalid occupants of an infirmary. Again, I could not discover, during my examination of the construction of the building, any way provided for getting on the flat roofs of these battlemented towers, in case of need. Well, although the front and side walls are surmounted by an embrasured parapet, I found no galleries behind; so that all these expensive parapet walls and flat roofed towers appeared to me to serve only the purpose of preventing a small quantity of snow from falling to the ground as snow—a use, we may safely conclude, that would not have been considered sufficient return for their cost in times when the useful took precedence of the ornamental in architecture.

I shall now proceed to point out a few of those mistakes, or such as appear to me to be so, that have been committed by modern architects in their attempts to imitate that style of architecture so peculiar to Scotland, and which was introduced in the sixteenth century, and formed by combining with the square massive features of the ancient Norman keep or feudal stronghold the crow-stepped gables or turrets common to the lighter and more picturesque architecture of France, and hence called the Franco-Scottish or turretted. Of this style we have several excellent old examples in this county;—Kelly, in this neighbourhood; Careston and Aldbar, near Brechin; and the widely-celebrated Glammis Castle, so familiarly, although fabulously, associated in our minds with the murder of Malcolm II. of Scotland.

The first building in the style of these old castles, to which I shall direct your attention, as an instance of the want of usefulness in its exterior form, is the newly-erected portion of the County Jail in Forfar. It has flat roofs, surmounted by battlemented parapets, and a bartizan turret at each corner, in imitation of an old feudal castle. Now, as neither these roofs nor turrets can be approached from any part of the interior, and only by a ladder placed on the roof of the lower building, there can be but one opinion as to their usefulness; and even considered as mere imitation of ancient forms, they are not correct in point of size or mode of construction. The old bartizan turrets were placed at the corners, and corbelled or projected out beyond the line of the wall, so as to command a better position for those who required their aid in defending the castle; but these do not project beyond the corner line of the building, and being almost solid, cannot serve any purpose, at least none that will justify the expense of their erection. Those placed on the angle of the court wall, and intended to look like watch-towers, are, if possible, worse in point of usefulness, as they do not serve any conceivable purpose—not being required to do duty as chimney-tops, like some of those on the main building, which, although an occupation suited to our more peaceful times, cannot be considered otherwise than derogatory to the high standing of those to which I understand they claim an imitative relationship, and still to be seen in Aboyne Castle. On one of the windows in the east elevation the architect has placed a crow-stepped gable, no doubt with the view of making it more in keeping with its neighbours the turrets; and in this he has certainly succeeded, as it would be difficult to imagine a more useless piece of masonry than a gable, placed as it is above a window finished or finteled below the top of the wall or the commencement of the slates. Such are frequently seen on modern houses; and if this had been a solitary instance, I should not have directed your attention to it. These remarks on the architecture of the County Jail apply only to the exterior. I am credibly informed that the interior arrangements are well suited for the purposes required, and do great credit to the painstaking talent of the architect.

The only other building to which I will specially allude, by way of showing the useless-

ness of modern turrets, is the Mechanics' Institution of Brechin. The whole of that structure, however, belongs more to English than to Scotch architecture, and is by no means decided in its style or character. The centre or principal tower is ecclesiastical, the main building an imitation of an English baronial castle, while the two turrets, one on each side of the projected part of the front, and behind the large tower, are, I am disposed to think, intended for imitations of Scottish corbelled corner turrets, yet the contour of the corbel mouldings is more English than Scotch. These, as well as the slim buttress towers placed at each corner of the centre tower and main building, are all finished with dome-shaped roofs, and have imitation battlemented parapets, and from their foundations to their decorated pinnacles all perfectly solid. There is another feature common to Scotch and English modern castellated buildings to be seen here, in the shape of a black iron-pipe peeping up at the back of the battlemented parapet, ashamed to own that it is a chimney, and unwilling to lessen the dignity of the castle by admitting the existence of a fireplace.

In concluding these remarks on secular architecture, I must request you to bear in mind that real excellence cannot possibly exist unless where, corresponding with the outward display of form, there is found an interior arrangement of the same character; and in order that we may be prepared to judge of what really is excellent in this sense, we ought to examine for ourselves the works of the great Architect of Nature,—take up a tiny shell by the sea-shore, one of the smallest of dwelling-houses erected after His design, but so admirably adapted to the requirements of its occupant, that we will search in vain for unnecessary indentations or projections there.

On ancient churches buttresses were not placed merely for ornament, as the practice of modern architects would lead us to suppose, but for the purpose of strengthening the wall where additional strength was required for the proper construction of the building, and principally against those parts of the side walls where the roof-beams rested, and at the corners, where on any building they are useful. Now, these two buttresses, placed one at each corner of the decorated gable of Erskine Church, do not appear to have been intended to serve any useful purpose. If meant for strengthening the corner, there ought to have been another one placed against the side-wall, and close to the corner. Where there was but one buttress placed, it was made so as to support and strengthen the building. I understand the architect could not, for want of ground room at the east side, place either the one or the other of these; but I really cannot see any good reason why he should have deprived the west corner of its companion buttress, merely to make it match with its mutilated neighbour. This practice of making forms to match is the leading or principal characteristic of modern architecture. It would almost seem as if some architectural law exists, and compels our architects to place on each side of the centre point or portion of their buildings precisely the same forms or objects, whether there does or does not exist a corresponding necessity for their construction. All I shall say regarding this common feature, and perhaps all I have a right to say here, is, that I have not been able to discover the slightest evidence of the existence of any such law having controlled the inventive talent of ancient architects. I have only in conclusion to express an earnest hope that the day is near at hand when our architects will direct more of their attention to the consideration of what is practically needful at the present time, and rely less on the works of those who have gone before them for assistance when constructing our houses; and if I have succeeded in showing you that there exists a necessity for their so doing, to use the words of Buchanan, the historian, "I shall have no reason to repent me of a little labour." If not, yet they who concur not with me in opinion cannot, I believe, disallow or blame my good-will; and I am so far from judging or taking it ill to have what I have written refuted, that if any man discover greater certainty, and convince me of my mistake, I shall return him great thanks for his pains.

## THE "PROTEAN" POWER OF BACON—STEAM (?)

WHETHER what I am about to notice has been noticed for the like purpose before, I know not; but even then, surely the thing itself is worth repeating, and especially as it may be *really new* to many, and of considerable interest to such parties as well.

Be it then known, that, as a poor man, anxious for *rich* knowledge, it has long been one of my habits, in my occasional passages through the streets of London, to show a great partiality for the old book-stalls; and thus many a weighty bargain—weighty in wisdom as well as in paper—have I picked up for really small sums—surprisingly so, now and then.

Lately, too, something of this kind has happened, in the purchase of an odd volume of the "*Augmentis Scientiarum*," or, "The Arrangement and General Survey of Knowledge," by the great originator of our practical philosophy, "Francis Bacon, Baron Verulam." It is one of a pair of volumes (the first) of a translation of this work, made by a Dr. Peter Shaw, and printed just fifty-one years ago, consisting of better than 330 pages; and though the page is not large—the size known as small octavo,—yet is the bargain truly golden: 330 pages of such printed matter, from the mind of the great Lord Bacon—for but sixpence!

Well, yesterday evening, at my supper-time, I was busy at the *Builder*, engaged in that part of the last number which gives so interesting a sketch of the history of steam—of our steamship manufacture, and our steam generating and propelling machinery.

Such, then, was my last evening's book-employ; and now this morning, while taking my bit of breakfast, I am also feeding on the "*Augmentis*," having eaten on nearly to the close of the volume. And here what do I find? Why, these far-reaching, clear-sighted *indications* of that power which now, among the numerous other manifestations of its ever-growing capabilities, is carrying the British sailor, despite of wind or tide, to battle hard with the Russian in the Baltic; and though ostensibly making common cause with the "barbarian" Turk, yet doing so under the ægis of Christianity itself—helping the weaker side, yet at the same time teaching it some softening of its authority, where it otherwise is strong, and the Christian himself has hitherto been compelled to yield the most abject submission to the dominary of the Mahomedan.

But no more of this; and now for the precious slice out of Bacon himself, which goes thus:—"As for chance experiments, these are plainly irrational and wild procedure. . . . . But if reason be joined, so as to show that the like experiment never was attempted, and yet that there is great cause why it should be; then this becomes an excellent instrument, and really enters the bosom of nature. For example, in the *operation of fire* upon natural bodies, it hath hitherto always happened, that either *something flies off*, as *flame or smoke*, in our common fires, or at least that the parts are *locally separated to some distance, as in distillation*, where the *vapour* rises, and the fæces are left behind; but no man hath yet tried *close* distillation. Yet it seems probable, that if the *force of heat may have its action confined in the cavities of a body, without any possibility of loss or escape*, this *Proteus* of matter will be *manacled*, as it were, and forced to undergo numerous transformations, provided only the heat be so moderated and changed, as not to *break the containing vessel*."

Now, the words here put into marked letters certainly convey a remarkably clear conception of that which we now call *steam*—or, as Bacon himself phrased it so much more nobly,—"this *Proteus of matter*," which, to be rendered subservient to the purposes of man in its *vapourous "form,"* was but needed to be judiciously "manacled," so that the "heat," whether generated "as in our common fires," or, "as in *distillation*," be allowed not to "break the *containing vessel*,"—those very "boilers" which are now the main agency of transporting the thundering cannon's mouth to the Baltic and other seas, and many more of which are still being manufactured at home, and not only for the destructive purposes of war, but for our road-travel, as also for working our colossal factory establishments. And our large-minded Lord Chancellor of England saw this all—the *germ* of it, assuredly—some two centuries and a quarter ago; while who knows but the *spirituality* of that great name is even taking cognizance of the results, and then glancing still farther and farther at what is yet to be the issue?

J. D. D.

## PROVINCIAL NEWS.

*Lincoln.*—The new church, or Bede Chapel, attached to St. Anne's Bede Houses, approaches completion. The architect is Mr. Butterfield, who has made the design, which is a plain one, to harmonize with the Bede Houses, the work of the late Mr. Pugin. The design has been carried out by Mr. Charles Ward, of Lincoln, builder. It is of red brick, and covered with Staffordshire tiles, having stone windows, and porch doorway of the Geometrical period, with a carving of the "Presentation in the Temple" over the porch. The bell-turret rises over the chancel-arch to the height of nearly 30 feet, and is octagon on plan, with geometrical openings: it is supplied with a bell, by Mears, of Whitechapel. The interior is fitted up with deal-stained seats in the nave to accommodate about ninety hearers. The chancel-stalls for the Bede women are of oak, as are also the altar-rail and table-frame, with suitable carvings. The roof timbers are wrought and decorated with azure, vermilion, and gold. Texts are distributed upon the walls. Mr. Wm. Mimmack was the artist employed in the decorations. The east windows will shortly be filled with stained glass. The reredos is executed in Minton's encaustic tiles, as are the decorations round the east window, and along the north and south sides of the chancel. The paving in the nave and chancel is of Minton's tiles, with rows of Yorkshire flags.——A memorial to the late Bishop of Lincoln (Dr. Kaye) is proposed; and a meeting was to be held at the Guildhall, on the 6th inst. to determine whether the model suggested by Mr. Westmacott should be adopted.

*Louth.*—On Thursday in last week a meeting in vestry was held for receiving the report of the Burial Board on the plans, &c. of the chapels and grounds in the intended new cemetery. Designs had been furnished by architects from London, Wales, Boston, and other places, from which the board selected those of Messrs. Bellamy and Hardy, of Lincoln and Louth, architects. It was resolved that 1,350*l.* be voted for erecting chapels, laying out grounds, and other necessary expenses; seconded by H. Allenby, esq. that the sum allowed be 950*l.* which being put to the meeting, the motion was carried by a very large majority; and after a vote of thanks to the mayor for his able and impartial conduct in the chair, the meeting broke up. The designs selected consist of two chapels, with vestries and other conveniences in the Early Decorated style, and a lodge and two entrance gateways in same style. The whole will be executed in white brick, with stone dressings.——Another large chapel, and corresponding schools and vestries, are to be built in Eastgate by the Wesleyan Reformers. The cost is estimated at 3,000*l.*

*Lynn.*—The south chancel window in St. Nicholas's Chapel, has just been filled with stained glass, to the memory of Mr. Frederick Lane, late town clerk and chapel warden. The subject, which is in eight lights, is the parable of the talents, Matt. c. xxv. commencing with the apportionment of the talents, and finishing with the return of the master, and his commendation of the faithful servant. The series are shown under tabernacle work, and in the tracery are angels in attitudes of praise and joy. Mr. Warrington is the artist.

*Taunton.*—A meeting of subscribers to the fund for the restoration of the Wellington monument in Somerset, was held here on Wednesday week, Sir P. Acland in the chair. Sir A. Hood presented the report, from which it appeared that 970*l.* had been raised, and 50*l.* more promised, making a total of 1,020*l.* The sum required for the erection of the work was 1,140*l.* The deficiency was therefore 120*l.* and besides, about 80*l.* would be required for

boundary-walls, &c. making a total of 200*l*. To raise the amount it was agreed that a committee of ladies should be appointed.

*Rhyl.*—Improvements made in this rising town, offer increasing accommodation to expected visitors. The main sewerage is completed, the streets covered, and many portions flagged.

*Birmingham.*—A committee is in course of formation, for the purpose of making a new attempt to obtain the introduction of the Free Libraries Act into Birmingham. The subject, it is said, will speedily be brought under the notice of the council. In order to strengthen the hands of Mr. Ewart, whose Bill for the amendment of the Act is before Parliament, a petition in its favour is being prepared. Since this was set up, Mr. Ewart's Bill has been thrown out.

*Derby.*—A new chancel window of stained glass, executed by Messrs. Chance and Co. has lately been presented to St. Paul's church by Mr. John James Simpson, under-sheriff. It is a memorial window to the late Rev. J. M. Pratt, who was incumbent of the church. In the centre light is a full-length figure of St. Paul. The two side-lights are filled with quarries of ground glass, with gold enamelled *fleur-de-lis* in the centre, surrounded by a border. The circular centre piece at the top is filled by a rosette.——At a recent meeting of the Burial Board, it appeared from the minutes of the committee appointed to carry out the works of the new cemetery, that they had called in the services of Mr. H. I. Stevens, architect, and Mr. Barron, of Elvaston, to suggest the best plans for the buildings and for laying out the ground. Mr. Haywood inquired if the board were not going to advertise for plans for the buildings on the new cemetery. He knew several architects that were anxious to send in plans. It was stated that the committee had not yet power to appoint an architect, and Mr. Stevens and Mr. Barron were not appointed. The question of advertising seemed to meet with favourable consideration, but was postponed. Three tenders were received for the drainage of the new cemetery—from Mr. George Thompson, builder, Derby; Mr. Moody, builder, Derby; and Mr. John Walker, builder, Littleover. Mr. Moody's, being considerably higher than either of the others, was not entertained, and a sub-committee was appointed to select from the two remaining tenders. The committee were empowered to accept the lowest tender, taking into consideration the quality of the materials.

*Stockport.*—The following tenders for alteration of Lancaster-bridge, Stockport, were opened on 23rd ult. by the county magistrates:

| | |
|---|---|
| Powell, Cheadle ..... | £295 |
| Bertram, Romely ..... | 290 |
| Forrester, Stockport ..... | 287 |
| Swindells, Romely (accepted)... | 285 |

——At a recent meeting of the municipal and parochial authorities, it was resolved—"That, in the opinion of this meeting the Improvement Act, 1837, gives the corporation full powers to make main sewers or arterial draining in any place in the borough which requires this outlet for its draining;—that it is the bounden duty of the corporation, the principal sanitary authority in this borough, to take care that such arterial drainage is provided;—that, therefore, the corporation be respectfully recommended to exercise its powers in the several townships of Stockport, Heaton Norris, Brinnington, Cheadle Bulkeley, and Cheadle Moseley, on the following conditions:—That the corporation shall make the main arterial drain, and borrow money, throwing it over a period of twenty years; that the inhabitants of each township shall repay the corporation one-half the expense of such arterial drainage forthwith; and that the respective boards of surveyors be requested to assist in carrying out this resolution forthwith."

*Tunstall.*—The first sod has been cut for the main sewers about to be laid down here. The engineer, Mr. Dale, at the ceremony, explained the nature and extent of the works, their desirability, and the great advantage the town may expect from them. The main trunks are 3 feet 6 inches inside diameter, formed of two rims of the blue Staffordshire bricks, set in hydraulic lime, and will be little short of two miles in length, and an average depth of 12 feet, the surface of the grounds giving a very considerable fall. The works are to be completed in eighteen months: they have been laid out, and are to be superintended, by Mr. Thomas Dale. The contract has been taken by Mr. William Forrester, of Stockport, for 25s. 10d. per yard lineal.

*Preston.*—The workmen employed on the parish church have commenced the alterations in the tower preparatory to the erection of the spire. The chancel floor is laid, and that portion of the new building is so far completed that it is expected to be ready for divine service in little more than a month. The plain glass windows will ultimately be filled with stained ones, presented by the following gentlemen:—Sir Henry Bold Hoghton, Bart. large east end window; two side windows, Mr. E. C. Lowndes; one by Mr. Richard Newsham; one by Mr. John Addison; and one by Mr. John Bairstow. The stained glass which formerly occupied the east window in the old chancel, will also be placed in the side.

*Newcastle-upon-Tyne.*—Two much-desired improvements have been resolved upon by the council, viz. the Corn Exchange in St. Nicholas-square, and the approaches to the high level bridge. The former will possess a music-hall and other public offices. It will consist of three orders, the chief story being Corinthian. The centre compartments of the façade are three large windows lighting the council-chamber, and the height of two floors. The corn-market will be raised several feet, over which is the music-room, 150 feet long, of the form of a trapezium, the mean width being 75 feet, and the height about 50 feet. Light is admitted through windows whose sills rest upon the entablature of the old market: their height is 8 feet, making altogether 32 feet from the level of the street. This height is obtained partly by the introduction of a gallery in the music-hall, the under-side of which is ceiled, running at an angle of about 45 degrees from the top of the window introduced to the ceiling of the market. The extension of two such lines would meet in the centre of the market, at the height of 15 feet above the level of the floor, which would be a vertical light below the point of concentration. The music-hall is entered at four different points by stone staircases. There will be in connection a large saloon at the entrance to the principal seats in the Cloth-market, besides several retiring-rooms for performers; and at the north end is another large room, 56 feet by 32 feet, for an ordinary on market-days, or a retiring-room for public dinners. The architects are Messrs. Johnston and Knowles.

*Panmure.* — Extensive improvements and alterations have been for some time in course of progress at Panmure House, the seat of Lord Panmure. A number of tradesmen are employed in and about the works, as also of labourers. The new garden-wall will average about 15 feet in height, but in some places it is nearly 20 feet. There are four vineries, each 20 feet by 20 feet; two peach-houses, 48 feet by 20 feet; an orchard-house, a green-house, and melon and cucumber-houses, with stove, &c. The conservatories are span-roofed, and the melon and cucumber houses extend to 120 feet. A corridor, extending about 280 feet, also span-roofed, runs the entire length of the hothouses, each having an entrance to it. This corridor extends east and west, and is about 6 feet broad. A fruit-room is erected at one end of the garden, and a bath-room at the other. Alterations are making on the house itself. The mason work connected with the house is under the superintendence of Mr. Morrison, of Edinburgh.

## SUSPENSION-BRIDGE AT CHELSEA.

WE give in our present number a view of the Suspension-bridge over the Thames, at Chelsea, which is now in the course of construction for the Commissioners of her Majesty's Works, under the superintendence of Mr. Page, their engineer. It stands nearly midway between Vauxhall and Battersea-bridges. Some particulars of the construction may be interesting. For the foundations, piles of elm timber, averaging 13 inches square, are driven at intervals of 3 feet, on an average 28 feet below the bed of the river, enclosed by a strong cast-iron casing, 88 feet in length, and 19 feet in width, with curved cutwaters. This iron case consists of piles and plates driven into the bed of the river, —the piles to a depth of 25 feet, and the plates 20 feet below the low-water line. These piles are driven at every 9 feet: the metal is 1 inch thick, and the plates are cast with ribs 6 inches deep, and have projecting pieces arranged to fit into the grooves of the piles: this casing forms the outside of the piers; it rises 7 feet above high water, and is surmounted by a moulded cast-iron curb. From the depth of the piles and plates below the bed of the river it prevents the water ever undermining the foundations. The elm bearing piles, are cut off at a level of 2 feet above low water, and are securely tied together transversely and longitudinally, by iron bars, bolted to every pile. The loose ground between the piles is scooped out, and the entire space filled to the top of the piles, with concrete, consisting of five parts of gravel to one part of blue lias lime: upon this concrete, two layers of thick Yorkshire stone landings are bedded, care being taken that no void is left between the under surface of the bottom layer and the concrete, but that the stones shall bear equally over the whole foundations. This forms the floor upon which the towers of the bridge are to be erected.

The towers, which are being prepared, are of cast-iron columns, 10 inches diameter, firmly braced and tied together, and are to be enclosed in an ornamental casing, partly of wrought and partly of cast iron. The space between the frame-work and the cast-iron casing of the piers and foundations will be filled in solid, with concrete, and upon this will be a layer of Bradford landings forming the floors of the piers. The chains will be carried over the towers on saddles, moving on rollers, 6 inches diameter, placed on a horizontal bed, and secured to the abutments by mooring-stones, from which spring strong brick arches, which sustain the weight of the concrete, forming the interior of the abutments. The mooring-stones likewise bear against the side walls, so that the whole weight of the abutments is made effective in counteracting the pull of the chains. The roadway is to be formed of wrought-iron girders placed transversely at every 8 feet of the bridge suspended to the chains by iron bars 2 inches diameter, and diagonally braced with smaller girders of similar construction, upon which rest the roadway-plates, and upon these the pavement forming the road. The footpaths are to be placed outside the chains, and supported at distances of 8 feet by wrought-iron cantilevers bolted to the transverse girders of the roadway. Between the footpaths and the roadway a wrought-iron girder 6 feet deep, and rising about 3 feet above the roadway, will run the whole length of the bridge, stiffening the roadway, and preventing that tremulous motion to which suspension bridges are so subjected.

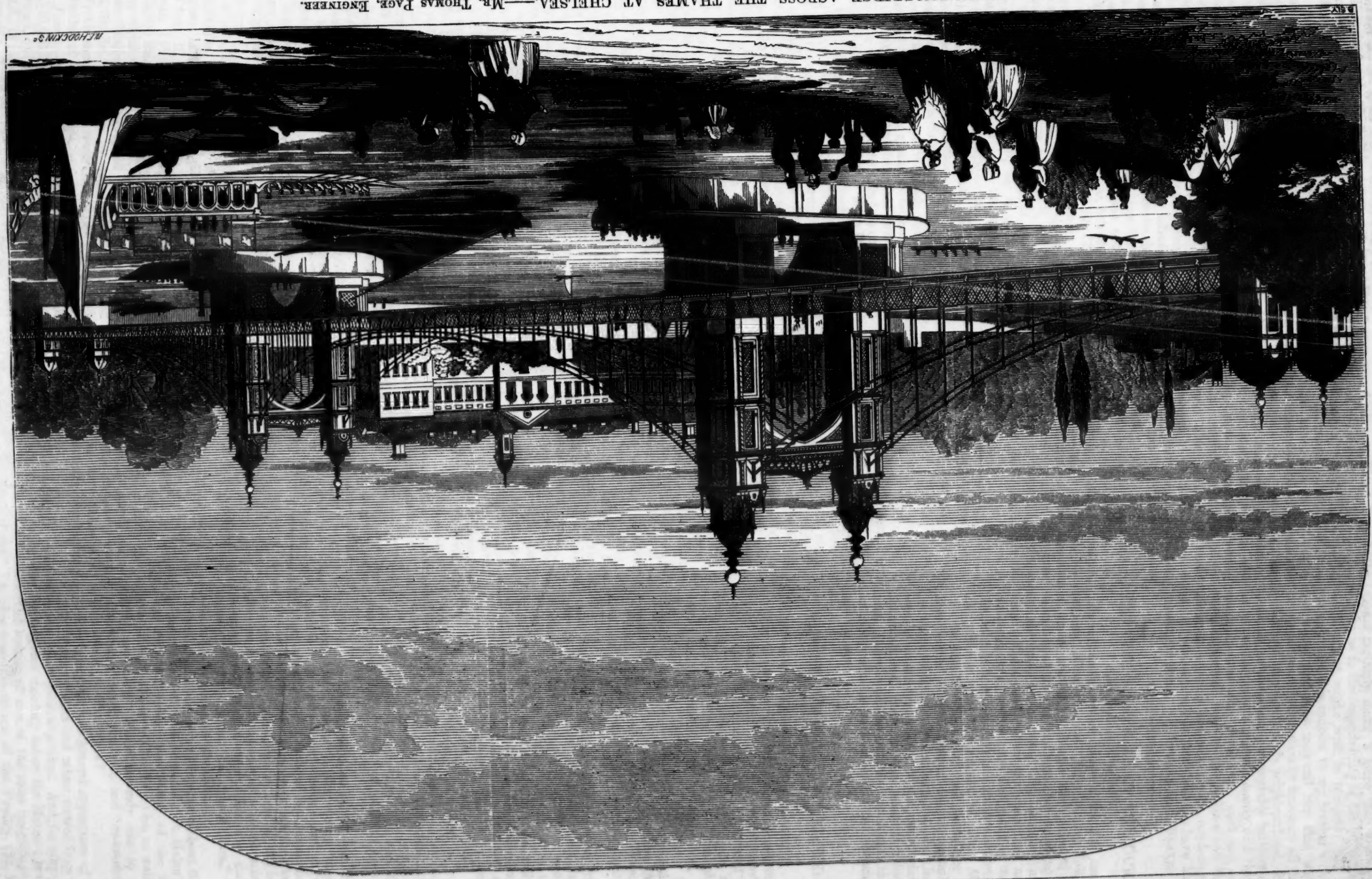
On each abutment two ornamental lodges are being built, in character with the architecture of the towers, and will serve as habitations for the toll-men.

In each tower there are staircases leading from the roadway to the piers, which will serve as landing and embarking places for the passengers by the steam boats.

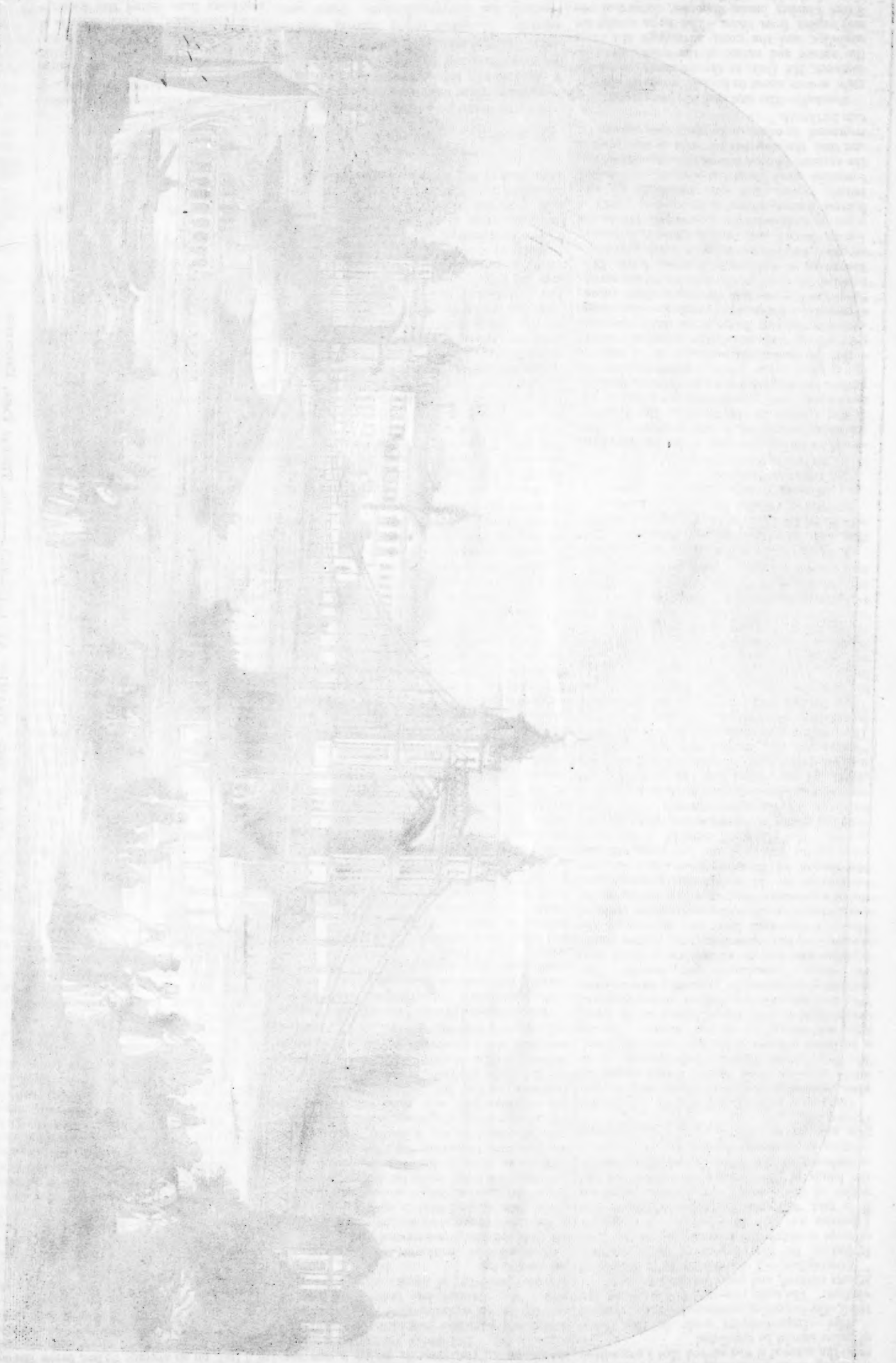
The following are the principal dimensions of the Bridge:—

| | Ft. |
|---|---|
| Length from face to face of the abutments at high-water line..... | 700 |
| Distance from centre to centre of the towers ..... | 352 |
| Span of centre opening ..... | 348 |
| Deflection of chains ..... | 29 |
| Distance between the chains ..... | 32 |
| Total width of bridge..... | 47 |
| Headway at the centre of bridge above Trinity high-water mark ..... | 21 |

It will be seen that there is much novelty in the construction of the foundations, and we are not surprised to learn that, since the bridge was commenced, several French and German engineers have visited the works, with a view of adopting in their own countries the method employed.



THE SUSPENSION-BRIDGE ACROSS THE THAMES AT CHELSEA.——Mr. Thomas Page, Engineer.



## MANUFACTURE OF GLASS AT ST. HELEN'S.

A LECTURE on glass was delivered lately at St. Helen's, by Mr. R. B. Edmundson. In the course of it, the lecturer said we were told that the first manufactory of flint-glass in England was established in the Savoy House, in the Strand, in 1552. There was also another in Crutched Friars; but it was not till long afterwards that the great improvements which had brought it to the present state of perfection, by the use of oxide of lead and closed pots, were introduced. In 1635, Sir R. Marshall obtained a patent for making glass of this description in consideration of his undertaking to employ pit-coal instead of wood in his furnaces. However, the use of coal was soon found to affect the colour of the metal. This gave rise to closed pots, which were used for the first time for that purpose. It was stated that it was not till 1784 that the metallic oxide was introduced into France, at a small factory at St. Cloud. This appeared to be incorrect, as Blancourt, who wrote in 1690, in his 4th book, not only mentioned it, but showed how to make it, and told us "if we don't work it with great care, no pots or crucibles will hold it, for it will crack them, and run out." Though we were told that flint-glass was not introduced into England until 1552, and window-glass until 1557, this would appear, from a contract spoken of by Horace Walpole, in his "Anecdote of Painting," between the Countess of Warwick and John Prudde, of Westminster, glazier, to be incorrect, and that at least window-glass must have been made at a much earlier date. In this curious treaty, which was dated 1439, "John Prudde was bound to use no glass of England, but glass from beyond the seas." It would be observed that this document, besides showing that the art of making window-glass was known and practised in England in the fifteenth century seemed also to tell us that it was of an inferior quality to that which could be obtained from abroad. Flint-glass works were soon started after this in various parts of the world, one small work by a foreigner, of the name of Lageer, in a narrow street in Gateshead, and another in the close at the opposite side of the Tyne. Both these works were close to the water edge. The latter had been carried on for a great many years under the name of the "Northumberland Glass Company." Several others were commenced in and about Newcastle at the beginning of the present century. He would name one, in particular, because it brought flint-glass for the first time into St. Helen's. This was situated on the east side of the town, and near to the river side. With these works Mr. Bell was at one time connected. About 1820, started the Ravenhead flint-glass works. These then appeared to be the first flint-glass works in St. Helen's.

The following table shows the wages paid, the coal used in the manufacture, and the weight of the material made per week, at the three plate works in the neighbourhood, viz.:—Pocket Nook, Ravenhead, and Sutton Plate works:—

*Weekly.*—77,000 superficial feet; 203 tons weight; 1,670 tons of coals; 1,750*l.* wages.

*Annually.*—4,004,000 superficial feet; 10,556 tons weight; 86,840 tons of coal; 91,000*l.* wages.

The following table shows the quantity of glass made, coal consumed, and wages paid, weekly and annually, by the Messrs. Pilkington:—

*Weekly.*—Rolled plate, 15,000 feet; weight, 45,000 lbs. or 20 tons, 1 cwt. 3 qrs. 4 lbs. Crown, 12,400 tables; weight, 161,200 lbs. or 71 tons 19 cwt. 1 qr. 4 lbs. Superficial contents, 148,800 feet. Sheets, 9,800; weight, 132,300 lbs. or 54 tons 12 cwt. 0 qrs. 16 lbs. Superficial contents, 88,200 feet. Shades and miscellaneous articles, 3,500 articles; weight, 10,500 lbs. or 4 tons 13 cwt. 3 qrs. 0 lbs. Weekly summary, 150 tons 6 cwt. 3 qrs. 24 lbs. Number of feet, 252,000.

*Yearly.*—Rolled plate, 78,000 feet; weight, 2,340,000 lbs. or 1,044 tons 12 cwt. 3 qrs. 12 lbs. Crown, 644,800 tables; weight, 8,382,400 lbs. or 3,742 tons 3 cwt. 3 qrs. 12 lbs. Superficial contents, 7,737,600 feet. Sheets, 509,600; weight 6,879,600 lbs. or 3,071 tons 5 cwt. Superficial contents, 4,586,400 feet. Shades and miscellaneous articles, 182,000 articles; weight, 546,000 lbs. or 243 tons 15 cwt. Yearly summary, 8,101 tons 15 cwt. 2 qrs. 24 lbs. Number of feet, 13,104,000.

The Messrs. Pilkington employ 1,350 hands in all. The coals consumed weekly, 1,700 tons, or, annually, 88,400 tons; and pay in wages, 1,050*l.* weekly, or annually, 56,600*l.* At the whole of the flint glass-works the hands employed were 280; glass made in tons, weekly, 41, or annually 2,132; coal used weekly, 190 tons, or annually, 9,880; wages paid weekly 244*l.* or annually, 12,688*l.* At the whole of the bottle-works the number of hands employed is 97; weight of glass made weekly, 28 tons, or annually, 1,456 tons; coals used weekly, 150 tons, or annually, 7,800 tons; and the wages paid weekly, 150*l.* or annually, 5,400*l.* The whole of the glass manufacturers employ 4,077 hands; use 3,710 tons of coal weekly, or 192,920 annually; and pay in wages, 3,099*l.* weekly, or the large sum of 161,148*l.* annually. He observed that at the rate the Messrs. P. were manufacturing glass, from computation he had made, they would be able to make a band of glass, a foot wide, to encircle the earth in nine years.

## BUILDERS IN BRIGHTON.

A FEW days ago I had occasion to visit Brighton, and to sleep there. On the following morning I rose early to return to town by the express-train, and finding I had full an hour to spare, I rambled about, looking at some few of the buildings now in progress.

There are several new houses being erected, some with one, and others with two and three floors above the ground-floor: most of them are erected in no style of architecture, unless it is a bad style: however, with this I will not quarrel, the architects (or, stay, there can be no architects)—the builders or owners have a right to please themselves, and adopt their own fancy ideas as to the style: with this the observer has no right to interfere; but he has a right, as one of the *public*, to express his disapprobation, if, in his opinion, the construction is faulty, inasmuch as circumstances may compel him some day to be an inhabitant of any one of the houses which casually may have met with his disapprobation, as in my own case. To while away an hour or more I looked at some of the buildings now in progress, and viewed with great regret the scamping way in which a great number of them were being built. The scaffoldings were by no means safely constructed—the scaffold-poles not only very slight, but the hitches very ignorantly passed round the poles: one would think that a workman would have regard for his own neck, if he had no regard for that of others. How many accidents occur from an ill-constructed scaffolding? However, to pass on from bad to worse: the buildings were chiefly built of brick, and one of the most *essential cautions* had been entirely neglected. The bricks were put together without either English, Flemish, or any other bond, and *joint over joint* for six or seven courses high: this repeatedly; mortar joints nearly three-quarters of an inch in thickness; and "bats" worked in out of number; indeed, a "stretcher" was a rarity. Over each opening there were *false* arches (although this defect is very general in other places as well as in Brighton), with their skewbacks bearing upon the lintels, instead of being quite free of them. One thing I am happy to say is, that the mortar looked pretty good.

Had the builders made up their minds to act contrary to the general clause in an architect's specifications, under the heading of "Bricklayer;" *i.e.* "no excess of *bats*, nor false arches, nor bad bond, nor bad workmanship of any kind will be allowed," I could only say that they had been most successful in their endeavours to do so, and have fatally avoided putting together the materials "in an honourable and scientific manner."

The real secret of this scamping way of building lies in the fact of the walls being afterwards rendered on the outside with stucco, "*the coat that covereth a multitude of sins.*" A few good country dances on the one-pair floor will, in my belief, give the builders, one of these days, a lesson not to scamp again. Should at any time my practice lead me to Brighton, I should certainly make a more than *ordinary* inquiry as to the respectability of the builder or builders that might wish to compete; and I strongly urge this caution to any brother architect whose profession may call him that way. Far be it from my intention to denounce all the builders of Brighton and its neighbourhood, for there are no doubt many respectable builders in Brighton, men who will deal honestly with their employers and with themselves: such men are to be respected; but for the builders and the workmen of such houses as herein condemned by me, neither I nor anybody else can have any respect for them. EDWARD C. S. BLAKE.

## THE CITY MEMORIAL OF THE DUKE OF WELLINGTON.

IT will be remembered that in the first competition, Messrs. Adams, Bell, Behnes, Foley, R. Smith, and Evan Thomas were selected to submit fresh designs, each sculptor receiving a certain sum of money. The designs thus obtained have been before the committee and the court for some time, and the result is that Mr. John Bell is named to execute the memorial. This will serve in some degree to solace Mr. Bell for the disappointment and annoyance at Manchester. We understand that the remarks we made on his first design have not been lost sight of in the preparation of the model which has succeeded. There is every reason to believe from the sculptor's honourable antecedents that he will produce a work worthy of the occasion and the age.

## A BRIEF FOR THE CONFISCATED CITY CHURCHES.

"Sarmatia fell unwept, without a crime."

IT may not be extensively remembered, that about twenty years ago some ecclesio-clasts, but not then of clerical character, planned to demolish about twenty city churches—to reduce some of the finest works of Sir Christopher Wren to old materials and rubbish; and, in their good taste and mercy, to include St. Stephen's, Walbrook! Public indignation, and appeals from some parishes, especially All-Hallows, Thames-street, checked *that* Vandalism, and the idea was buried in ignominious silence.

As the revival of that would quite as little now be borne, we are threatened with their *removal*—to suburban parishes. For, vested rights might render their "squatting" in the midst of populous metropolitan districts, rather too expensive. And what is the fault found with these hardly-used temples,—that they are awkward and unpicturesque where they are—that they "stop the way" architecturally or religiously, or are at all inconvenient to congregations in their present position? No such thing. It is a case of simple neglected merit. And for that, "sentence of death" must be "recorded" against their cure rank, and they must be banished for the rest of their lives to ungenial regions.

Or is the City thought so pagan, that they must be taken out of it, like second "Elgin marbles," to some more civilised and appreciatory communities? Shade of Sir Christopher! who built them not only where, but *for* where they now stand; who didst thy best in thy long life for the ornamenting a city of many churches;—arise, and, with a tear down thy manly cheek, protest against the "hard lines," on which thy respect now has fallen!

What would many buildings be without their "associations?" Where would "St. Helen's" and "St. Catharine Cree,"—one of the first semi-Roman churches (Charles I.) be, so well as they are now? Would anybody like to see Caernarvon Castle removed, and "re-erected," as a lounge, in Hyde-park?

The injury to the general appearance of the city, both on land and when viewed from the water, is one great objection. And, for example, let any one standing before the Mansion-house, and looking at one of the most insignificant—that near the corner of the Poultry (St. Mildred's), ask his own taste, whether something

picturesque would not be taken away from the scene? And what is to become of the "Forest of Spires" seen from the Thames—our own pleasure, and our boast too, and admitted by foreigners? The lofty spire of St. Gabriel, Fenchurch-street, above 200 feet — the high tower of Aldermary, only second to Cornhill—and a number of others, all "telling" more or less, gone where, in future, they will be only viewed singly. P.

## ARCHITECTS AND THEIR RESPONSIBILITIES.

As this question is becoming a very serious one, the more the difficulties which attend it are known, the better they may be discussed. I send you a brief account of what lately happened to me in my practice.

I was called upon to superintend the pulling down and rebuilding of a party-wall in a building of mixed character, which had been very properly objected to by the district surveyor. After having all the floors and roof safely shored up from bottom to top, the wall was taken down to the level of the ground. I then directed that the workmen should excavate a *short length* of trench to form concrete foundation, and that this should be soundly filled up before any further excavation should be made, and also that the trench itself should be strutted (with planks on each side), to keep the ground from yielding by the weight of the shores. This matter happened to be in my own immediate neighbourhood, and the case being somewhat "critical," I visited the premises at an early hour in the morning to satisfy myself how far my directions had been attended to. The master builder was not there—his foreman was not there—the bricklayer even was not there,—but a couple of labourers were busily employed in excavating the *whole length of the trench, and neither planks nor struts were provided*, nor had the carpenter been sent to for them. In another hour it is my confident impression that, but for my timely interference, the whole would have come down with a crash, and probably some life or lives been lost. Now, had this been the case, could it have been considered the fault of the architect (who might have been called out of town)? Surely not, if he had used every reasonable precaution. Was it the builder's? His answer would have been, that he had sent a very competent workman as a bricklayer. This was true, but the morning was wet, and he was "drying" himself elsewhere. Who would then have been to blame? In my mind the best way is neither to claim nor disclaim individual responsibility, but admit it fully to this extent, viz.—that morally, every man, from the employer down to the operative, is mutually liable,—the architect to the employer, for the builder he engages; the builder to the architect, for the workmen he sends; the workmen to their master, for keeping him out of trouble; and the employer to the public, for the architect he retains. This would go some way to establish a better fraternity among modern Freemasons, and give the utmost security to each other, and to the public. J. T.

## PLAIN TILE COVERINGS.

*As there are now several large reservoirs in* course of construction in different parts of the country for sanitary purposes, and which are mostly being covered in with brick, I do not think I shall be much out of place in calling your attention to a few remarks upon plain tiles, which I think quite as good, much cheaper, and less weighty than brick arches. I was recommended to try them by the late Mr. Culyer as a covering over a coal-store of a gas-work with which I am connected, the upper part of which we wished to make use of as a reservoir to catch all the rain-water from the other buildings. Our store is 35 feet long by 12 feet wide in clear. We first turned two 9-inch hollow brick arches, and one 9-inch hollow brick beam across, thereby dividing it into four open bays, which we then covered in with three courses of plain tiles laid in Portland cement, herring-bone fashion; interspersed with hooping bond. The walls are of an average thickness of 14 inches, and carried 2 feet 6 inches above. The whole arches, tiles, cement sufficient to build a 4½-inch wall all round, the 2½ feet high, plastering, labour, and all complete, cost a trifle less than 4*l.* per square of 100 feet during our last dear season. I have every reason to think that this tank bottom would carry twice the quantity or weight which we can put on it,—a load equal to nearly or quite thirty tons. We had twenty-two or twenty-three people on the top within a week of the completion, some heavy men. I think this rather a severe trial when barely dry and set. This is intended to have two or three coats of coal-tar put on hot. There are a number of purposes for which a covering of this description might be used. I have heard many complain they cannot have water-closets because of the expense of force-pumps, &c.; now all can if they like, without pumps being required. A tank of the above description, to hold 150 or 200 gallons, which they can catch from the roof of any house, however small, instead of letting it, as now, in many cases run to waste, would be quite sufficient.

T. J. RICKON.

## CONSTRUCTION OF HOLLOW WALLS.

As dry walls to a house are so important, and as both brick and stone are often very pervious to wet, it may be interesting to the readers of the *Builder* to learn what plan for the construction of hollow walls is most to be recommended. The only method yet practised to prevent completely the percolation of water from the outer surface to the inner surface is by the use of iron stays, the two ends of which are built into the outer and inner walls respectively, and the middle part is bent downwards, so that water cannot follow the course of the iron, but must drop to the bottom of the cavity between the walls: these stays connect the two walls so that they form one firm wall.

In the case of a large house which is to be built externally of the Sussex sandstone, which is very porous, it is proposed to build the walls hollow; on the inside 12 or 9 inches of brickwork, and on the outside 9 inches only of stone, leaving 3 inches cavity; bonding the brickwork and stonework together by stones of about 17 inches wide. Now, it is a question whether by coating the bondstones with pitch, where they form the connection with the inner wall, the moisture collected by the external wall can be prevented from running through into the inside wall. If so, there is no necessity to use iron stays, the durability of which must be questionable. PREVENTION.

## NOTES AND INQUIRIES.

### ARCHITECTURAL AND ARTISTICAL.

*Iron and Water.*—In answer to your correspondent "W. L.'s" query as to some means of preventing the peroxyde deposit in iron hot-water pipes, I may state that in the boilers of locomotives (where this deposit is very considerable and highly injurious), *molasses* has been put into the water in small quantities, and is said to have removed the evil,—but how this method would answer in a bath I cannot say.

PALLADIO.

## SURVEYORS AND SPECULATIVE BUILDERS.

LAY *v.* KEMPSHAW.—This action in Marylebone County Court was brought by a surveyor to recover 37*l.* 10*s.* of the defendant, who is a publican and speculative builder.

Mr. Lay stated that in 1853 the defendant instructed him to erect a portico; after which he was engaged to make out drawings, let houses, and to superintend the building of defendant's houses. He was as surveyor and clerk of the works, on defendant's building premises early and late, daily. Always understood that he gave defendant every satisfaction, and Mr. Kempshaw had invariably spoken of him and treated him with the greatest kindness. Sometimes the defendant interfered in the operations going on at the buildings. A number of workmen were employed, and witness saw that they did their work as mechanics. It was not usual for architects to perform the multifarious duties witness did. He had to attend the Commissioners of Sewers, the road trusts, and had supplied each board with drawings. Had been an architect and surveyor all his lifetime. The charges made were moderate and fair. In cross-examination.—It was the custom of witness's profession to charge five per cent. on the outlay (book prices). Had not charged at this rate in the present instance. The two houses witness superintended for defendant cost 800*l.* but he (plaintiff) had only put them down for 750*l.* The specifications he made were for labour, not materials. Has charged five per cent. on 750*l.* only. Was dismissed before they were completed, but they were in full carcass, and the interior work was nearly done. Does not know the reason of his dismissal. Defendant did not complain to witness about the drains being above the floor. Defendant complained about the brickwork being covered over. More was done than was necessary through Mr. Kempshaw's interference. In digging out the foundation the defendant gave directions contrary to his. Some of the flooring was wrong. In consequence of a complaint the Commissioners of Sewers sent their officers to inspect the drains.

Mr. J. Pennington, surveyor, deposed to viewing the houses in question, 1 and 2, Kempshaw-terrace, Kilburn, and to looking through the items of plaintiff's account. He considers the charges very moderate.

Mr. Brown, bricklayer, said he contracted with defendant for labour to the amount of 68*l.* 9*s.* Mr. Lay was on the works morning and night, and measured up witness's work.

Cross-examined by Mr. Bignell.—The drains put in under Mr. Lay's superintendence had all to come up again. They were lower than the sewers, and had to come up because water would not run up-hill. Heard Mr. Kempshaw complain about Mr. Lay's inattention to his interests.

Other witnesses having been examined,

Mr. Bignell, for defendant, said the answer to the action was, that the buildings, when the plaintiff was dismissed, were not worth 750*l.* the sum plaintiff charged commission for, nor did their value amount to anything like 500*l.* Whatever the value of the houses were, his client was willing to pay five per cent. on that amount, and which, according to his client's valuation would come to 32*l.* and their set-off of 14*l.* 4*s.* 4*d.* would, deducted from this, leave the amount paid into court.

Mr. Kempshaw stated that he discharged the plaintiff on account of his bad management. He complained to him about burying 2½ rods of brickwork, and he threatened to make away with himself. Plaintiff's drains went 2 feet below the sewers. They were obliged to cut away the fireplace to make headway. Plaintiff had taken one of the houses for himself, and for this house he had ordered plate-glass for his windows, and mahogany for other parts of the house, and other expensive materials which were not required. When witness discharged him he had not expended 400*l.* on the houses. When finished they would cost about 700*l.* In cross-examination.—The houses were not yet finished. Had not yet fixed their rental. They would not let for 100*l.* a year each. Had asked a party 100*l.* for the rent of one. Mr. Lay was to pay 50*l.* a year rent for one. Is no scholar. Bought timber to build them at the sale of the Hippodrome for 74*l.* enough to build four houses. Was offered 100*l.* for his purchase.

Mr. Worthington was called to prove that in conversation he had with plaintiff, he told him (witness) that the houses would not cost 500*l.*; and that they were not substantially built, and the timber was of an inferior description.

Mr. Keene (for plaintiff), in reply, observed that this was one of those cases in which professional men had to suffer from the interference of ignorant principals. The defendant, Kempshaw, who knew no more of building than he did of letters, had thought fit to give contrary directions to those laid down by his surveyor; and the natural consequence was that *the drains were not on a level with the sewers, and* some of the brickwork got buried through the deep foundations sunk, through the defendant's orders. Finding these evils to result from his ignorant interference, the defendant threw all the blame upon a gentleman well versed in all matters relating to buildings, and had thought fit to refuse payment for his services. With respect to the value of the houses, it was preposterous to suppose that they were not worth 750*l.* when defendant acknowledged to asking 150*l.* a year rent for the two. His client had produced the evidence of Mr. Pennington, a surveyor of high standing, and who had very fairly stated that the charges were moderate. The defendant, on the other hand, had not thought it desirable to bring forward rebutting testimony as to surveyors' valuation, but relied upon his own opinions, backed by his ignorance of figures or of a foot-rule. He urged upon the Court that the plaintiff was fully entitled to the amount claimed.

The Judge (Adolphus) said he did not think the case was made out. He was not sure whether the plaintiff's being discharged for negligence and for damages arising from such, as was deposed to, did not

bar any claim upon the defendant. He must give a verdict for the defendant, and with costs.

Since this decision, Mr. Keene moved for a new trial, on the grounds of the verdict being unsupported by evidence; and further, that professional men did not come under the same category as domestic servants, who could not recover for wages when dismissed for improper conduct.

A rather warm discussion took place between the judge and Mr. Keene respecting the view taken by the court, and the judge took time to consider the motion; since which, his Honour gave judgment, by refusing the application for a new trial, with costs.

## ARCHITECTS' ASSISTANTS.

ALLOW me to ask your sympathy in behalf of the assistants of the architectural profession. Persons engaged in the executive department throughout the metropolis have for some time past made it a rule for their men to leave their employment at an earlier hour on Saturdays. The same may be said of many of the mercantile houses in the City. And why should not the same privilege be extended to the architects' assistants, who are mostly confined in offices for eight or nine hours per diem, and who would be only too happy to avail themselves of the opportunity which would be afforded them for recreation and improvement both of body and mind, if the time for closing architects' offices on Saturdays could be fixed at one o'clock p.m.? and thus during the long days a few hours would be afforded them for professional improvement in the ways you have at times so wisely suggested.

SET SQUARE.

## AMERICAN PATENTS.

The following are taken from the list for January, 1854, published in the *Journal of the Franklin Institute of Pennsylvania*:—For an Improved Mode of Fixing Likenesses in Monuments: Wm. Boyd, Garrettsville, Ohio. Claim.—"Combining with a monument or grave-stone, a case, having a concave mirror set in the back part, and having also within it a miniature likeness of the deceased, which may be kept secure from the action of the weather, or from liability to receive other injury, said miniature being attached to the cover of the case in such way that by opening the cover, the likeness may be viewed by reflection in the mirror, substantially in the manner set forth." For an Improved Mortising Chisel: J. W. McGaffey, Philadelphia, Pennsylvania. Claim.—"Having two cutting lips inserted in a slot or recess in the lower end of a stock, said lips working upon pins which pass through the stock. The inner surfaces of the lips being constructed as shown, and having a tongue working between them, which tongue, when the chisel is raised, forces apart the cutting edges of the lips, and throws out the chip from between the said lips; the cross-bar of the tongue, when the chisel descends, throwing apart the upper portions of the lips, and closing the lower and cutting ends, the tongue being raised between the lips by means of the spring, or its equivalent." For an Improvement in Mortising Machines: Hezekiah B. Smith, Lowell, Mass. Claim.—"The combination for reversing the chisel, by power applied by friction (with band, or otherwise) and stops, operated so as to stop the chisel when reversed, in the manner essentially as set forth." For an Improved Mortising Machine: Jacob E. Brown and Stephen S. Bartlett, Woonsocket, Rhode Island. Claim.—"Operating the chisel by the graduated conical cam, in combination with mechanism described, or its equivalent, which enables the operator to vary the length of the stroke made by the chisel while it is in operation, or suspend its motion at pleasure, without disconnecting the driving power applied to operate the machine." For an Improvement in Machinery for Mortising Frames for Window Blinds: D. M. Cummings, North Enfield, New Hampshire. Claim.—"The moveable platform, spacing gauge, and oblique ways, when combined and arranged with each other, and with the adjustable gauge bits, &c. or their equivalents, in such a manner that the mortises formed will be exactly equi-distant from each other, and also, in such a manner that any desired degree of inclination may be given to said mortises, substantially as herein set forth; disclaiming the use of the said moveable platform, save when employed in combination with the spacing gauge and oblique ways, as set forth." For an Improved Machine for Making Window Blinds: Moses C. Stiles and Tristram S. Lewis, Hollis, Maine. Claim.—"We do not claim the cutter, chisel, or any part of the machine, separately; but what we do claim is, the combination of the cutter and chisel, worked simultaneously by the foot of the operator, or by other power, in the manner and for the purposes set forth." For a Spiral or Worm-Joint Hinge: Perry G. Bates, Waterbury, Connecticut. Claim.—"The spiral or worm-joint hinge, constructed as described."

## Miscellanea.

KILKENNY AND SOUTH-EAST OF IRELAND ARCHÆOLOGICAL SOCIETY.—The March meeting of this society was held on Wednesday week, when a whole constellation of new members, headed by Lord Rosse himself, were proposed and elected. The secretary then laid on the table the printed Transactions for 1852, with numerous illustrations, and announced that the part for 1853 will also shortly be ready. The first instalment of the society's publications for 1854, under an expedited arrangement, was also produced. Various presentations to the library and museum were then made, and papers read on Sligo Antiquities, "Giants' Cinders," the Archæological Court of the Irish Exhibition, the Old Kilkenny Canal, and St. Patrick's Money. By the new arrangements, members may obtain the full proceedings of each meeting in as short a time as possible after they take place.

THE IRON TRADE.—The quarterly meeting masters met in great force to resist any attempt by speculators to raise prices, and it was resolved that no advance should be made: indeed, the actual prices have rather shown a tendency in the contrary direction. The nominal prices, therefore, per ton are still 10*l.* for bars,; 11*l.* for hoops; and 12*l.* for sheets. Pigs are looking up,—for hot or cold blast respectively, 5*l.* and 5*l.* 15*s.* There is a falling off in the foreign markets, but a steady home trade, especially for marine purposes. The total exports from the United Kingdom in 1852, have been stated as follows:—Pig-iron, 240,491 tons; bars and rails, 548,996 tons; rods, 18,696 tons = 808,183 tons. Of which there were shipped to the United States—Pig-iron, 104,230 tons; bars and rails, 334,224 tons; rods, 1,439 tons = 439,893 tons; leaving 368,290 tons for the requirements of the rest of the world.——New iron works have been founded in South Durham as well as in North Yorkshire, for the working of the Cleveland iron stone. The Mersey Steel and Iron Company's new works, at Liverpool, were opened on Saturday in last week, with a dinner for 500 persons, principally those employed about the works.

NORWICH SCHOOL OF DESIGN.—A general meeting of the subscribers of this institution was held on Monday in last week, when office bearers were appointed, and the chairman explained the reasons which had led to the recommendation, on the part of the committee, to the Board in London, to remove Mr. Heaviside from the office of master. From this explanation it appeared that there was no specific charge against him, but that he was "eccentric and impracticable" in his conduct, so much so that the committee could not work with him; and had also given great dissatisfaction in the school by favouritism to particular pupils. These explanations were deemed satisfactory, and the proceedings terminated.

LIVERPOOL TIMBER MARKET.—A broken cargo of Quebec pine, 45 feet average, has been sold to the trade at 2*s.* per foot from the yard. Of St. John the only parcel landing is being yarded, and is held for 10*d.* per foot over the average girth, or for 18-inch, 2*s.* 4*d.* per foot. Three cargoes of Baltic timber, of good quality, have changed hands at 2*s.* 6*d.* per foot. Of the cargoes of deals recently arrived two have been sold from the quay; one of pine and spruce mixed at 13*l.* 4*s.* 3*d.* round, and the other, with less pine, at 13*l.* per std. being equal to an advance on the previous sales of 20*s.* to 25*s.* per std. The still low price of deals, compared with that of timber in the log, will ensure a demand for this description of wood, and the stop to the supply from the Baltic, which last year was 1,326,325 loads, against 1,204,629 loads colonial, or equal to 59 of the whole supply, is materially enhancing the value of present stocks.

INDUSTRIAL TRAINING IN WORKHOUSES.—The *Irish workhouses had above 1,000 acres of land under* cultivation at Michaelmas last, either wholly or partially, by the boys in the workhouses, the number of boys so employed being 3,783; and 3,196 boys were being instructed in trades, as tailors, shoemakers, and the like. The whole number of boys (between nine and fifteen) in the workhouses was 12,320; of girls, 14,273. Of the girls, 9,166 were under industrial training. The instruction occupies four or five hours a day. During the previous year above 5,000 boys and girls obtained employment outside their workhouses.

BUILDING REGULATIONS AT RUGBY.—A petition, by the builders of Rugby, is said to have been presented to the Local Board of Health, requesting the board to reconsider a resolution that the party walls of houses be carried up past the slates, and representing that without this the walls would be as effectual for the prevention of fire, and the cost of building very considerably lessened. Surely there is some mistake in this report: we cannot believe that the Rugby builders have made any such representation. The matter, it is added, was ordered to stand over till next meeting of the board.

STRIKES, &c.—It appears that the skilled workmen at the Crystal Palace, Sydenham, who have been receiving 6*s.* a day for ten hours' labour, and were carried on the rail to and from work for 9*d.* a week, have struck for "nine hours a day and no surrender." A printed notice was issued to the effect that the demand could not be entertained. The directors expected that the inconvenience would be but temporary.——A large number of the journeymen joiners of Hull lately struck work. They required an addition of 6*d.* a day, besides some alteration in the time of working. The masters resisted the application: bad trade and the increased price of materials, they said, did not justify such an advance.——A recent difference between the master joiners of Hawick and their workmen lately assumed a more serious aspect. Eleven of the employers having combined to resist the demand of the workmen, they adopted a resolution somewhat similar to one adopted by the Edinburgh masters, contending that there was no reason for a rise of wages at present, and that, therefore, they who were dissatisfied and left their work would have no chance of obtaining employment in the locality, as they were determined to adhere to their resolution. A number of the workmen have already left, as they consider the wages lower in Hawick than in other towns. The average wage here is 17*s.* per week, not 1*l.* as was elsewhere reported. The men have asked 1*l.* which has been refused.——The master joiners of Selkirk held a meeting on Saturday week, at which it was agreed to grant the request of their workmen to shorten the hours of labour from sixty to fifty-seven per week.——The journeymen joiners, masons, plumbers, and slaters of Galashiels have come to an amicable arrangement with the masters for a reduction of three hours on Saturday afternoon (thus bringing the week to fifty-seven hours) at the same weekly wage as hitherto, with the exception of the joiners, who receive a shilling advance, making their weekly wage 1*l.*——In consequence of a representation to the Arbroath master painters, the journeymen have received an advance of two shillings a week on their former wages.

ARCHITECTS' CHARGES.—*In causa*, Norton and Another *v.* Blanckensee, at the Birmingham County Court, reported at some length in the local *Journal* plaintiffs were architects and surveyors, in Birmingham, and defendant, a merchant, of same place. The action was brought to recover 78*l.* for professional services rendered by plaintiffs, father and son, to defendant—the principal item, 58*l.* 16*s.* being charges for superintendence in erection and finishing of eight front houses, six back houses, and two shops, situated in Wrottesley-street, a new thoroughfare leading out of Smallbrook-street. Defendant, "in case it should be considered plaintiff had performed the duties of a superintending architect or clerk of works, and that he was entitled to the usual 2½ per cent." had paid into court 33*l.* namely, 28*l.* for per centage, and 5*l.* for other charges. For plaintiffs, Mr. J. W. Hornblower, Mr. S. Briggs, and Mr. Lee, were called, and deposed that, in their opinion, the charge of 58*l.* 16*s.* was not an unreasonable one. After other evidence was given on both sides, the jury returned a verdict, finding the plaintiff was entitled to 2½ per cent. on the outlay, namely, 28*l.*; and as 33*l.* had been paid into court, the verdict was entered for defendant.

THE DAY OF HUMILIATION.—It is announced that we are to have a day of humiliation and prayer on account of the war. Whatever else this may mean, I presume it will involve a total cessation from business. In this case all persons who are paid according to the number of hours they work will lose one-sixth of their weekly wages, whilst all those possessed of a yearly income or salaries will lose only a day's work, about which there will be very little indignant correspondence. I do not profess any very profound comprehension of the theory of these matters, but I cannot imagine that it is in any way contemplated that one class of the community should make sacrifices which the others do not, nor can I believe that it is intended that the working classes generally should have this self-inflicted foretaste of the hardships and the burdens which, for the sake of the freedom and happiness of their children and their children's children, they will assuredly before long have to endure. The remedy is so simple, that I hope you will not only suggest it to that numerous class of your readers who are employers of labour, but urge it upon them as an act of justice which they are bound to do: by giving their men the option of making up the day so lost by an extra hour every day for a fortnight, or two hours per day for a week, neither party would suffer any pecuniary loss.—B. H.

THE ST. MARGARET'S ESTATE, RICHMOND, is to be allotted on the 7th June. It contains 75 acres on the banks of the Thames, purchased of Lord Kilmorey, by the Conservative Land Society. Something is said of the erection of a new station at St. Margaret's, between Richmond and Twickenham stations. It is intended to preserve the mansion if possible.

SOCIETY OF ANTIQUARIES OF SCOTLAND.—A meeting of this society was held at Edinburgh on Monday in last week. A paper was read on the coinage of Ceylon during the thirteenth and fourteenth centuries, by Dr. W. H. Scott. Dr. Beddoe, Fellow of the Ethnological Society of London, then read a paper on Scottish ethnology. Mr. John Stuart read a notice of an "eirde" house, or underground chamber, recently discovered in the parish of Tarland, Aberdeenshire. Numerous donations to the museum and library were laid on the table.

OMNIBUSES FOR TRADESMEN.—If a spirited company would take this matter up, much good might be done. I rode to-day in *three busses, and they were not half full;* because the fares are too high, and the deception too frequent. I suspect these omnibus proprietors will not see their interest until the new light brings the air and water carriages upon the road, and then good-bye to omnibuses.—T.

RESTRICTED LIABILITY IN PARTNERSHIPS.—An important debate, extending over three days, has occupied the attention of the Liverpool Chamber of Commerce on this subject. The council of the chamber had adopted a resolution recommending a change in the law, so as to legalize limited liability partnerships. The result of the debate is, the adoption of the council's proposition by a majority of twenty-seven to eighteen. The question, however, is deemed so important, that a poll is to be taken after the publication of the discussion.

SALE OF THE ATTWOOD ESTATES.—The estates of Mr. John Attwood, consisting of farms and houses at Harwich, and the mansion and domain of Hylands, have been offered for sale and partly sold. The first day's sale, on Tuesday in last week, comprised a part of the property at Harwich. Twenty lots were sold, including "Holly Lodge" mansion, Dovercourt, for 2,600*l.*; and Dovercourt Hall Farm, for 2,150*l.* Brookman's Farm, house, homestead, and 83a. 0r. 11p. in Dovercourt, was sold for 2,200*l.* The Hylands estate was offered on Wednesday. After some delay, a gentleman bid 150,000*l.* No other bidding was made. Mr. Beadel said, the lowest price he was instructed to sell at was 240,000*l.* If not disposed of by private contract, the estate will be shortly cut up into lots. For the remainder of the farms and houses at Dovercourt and Harwich the biddings were very spirited; property in that district, it would appear, standing high in public favour, there being a struggle to secure the various lots, which it was considered realized enormous prices. The "Toll Gate Farm," Dovercourt, house, homestead, and 38a. 2r. 36p. let at 92*l.* 10s.; copyhold; sold for 2,000*l.* "Dove House Farm," Ramsey, house, homestead, and 26a. 0r. 38p. let at 57*l.* 10s.; copyhold; sold for 2,050*l.* Residence, Ramsey, in hand, and two fields, let at 28*l.*; leasehold for 999 years from 1678, at peppercorn rent; sold for 700*l.* Ditto, ditto, near Toll Gate Farmhouse, let at 20*l.*; sold for 440*l.* Two enclosures, "Upper and Lower Clays," 14a. 3r. 3p. Dovercourt, held at 29*l.*; copyhold; sold for 800*l.*

DISCOVERY OF ROMAN REMAINS.—There have been lately discovered in some gardens near Nerac (Lot-et-Garonne) a number of Roman mosaics representing birds, fruits, fishes, flowers, and arabesques. They are considered to belong to the era of Julius Cæsar, and are supposed to have been used in the palace of one of his pro-consuls. A local tradition declares that they were discovered a first time in the thirteenth century, and employed by the Templars in a magnificent commandery which they had built on the site now occupied by the gardens mentioned above. That building, the traditions state, was burnt down in about a century after, and human skeletons, charcoal, and burnt matters of various kinds lately found on the spot, seem to give some countenance to the story. A part of the mosaics were purchased by a gentleman residing in the neighbourhood to adorn his country-seat, and the rest have been offered for sale.

THE ST. KATHERINE DOCKS.—A new warehouse for housing foreign goods in bond, has been completed. It is believed to be the largest and most complete building of the kind in the country, and has an imposing appearance from its magnitude.

WATERPROOFING OF RAILWAY ARCHES.—It has lately been my misfortune to diurnally perambulate, on my way to the "City," a line of thoroughfare having railway bridges thrown across some of the streets. Now, though I am not so fastidious with regard to dress as many young men of my acquaintance, I *do* most strongly object to an overcharged globule of rain, or other liquid, descending in my neck, spoiling one of the stiffest of "threefolds." I am an enemy to "Dampers" of any description in general, and showers (Danaen only excepted) in particular, but to "be put out of one's way" (having to go down the next turning) when a felt lining would cheaply and adequately provide a remedy, is more than can be borne by your humble servant, RHEUMATICUS.

DUBLIN.—A correspondence has passed lately between the Lord Lieutenant and the Lords of the Treasury on the subject of the application for a grant of money to carry on certain improvements in the city of Dublin. His Excellency, as we announced, had recommended a grant of 60,000*l.*; but the Treasury, though "fully alive to the advantages which would result from the accomplishment of the various plans suggested, regret that they are unable to comply with the request, as they could not ask Parliament to grant money from the general revenue of the country for the purpose of effecting local improvements, however desirable they may be." Notwithstanding this reply, the corporation are about to send a deputation to London, to renew the application to the Prime Minister.

BURNING OF HUNGERFORD-HALL, STRAND.—Hungerford-hall was totally destroyed by fire last week, while in possession of the proprietor of a panorama of the funeral of the late Duke of Wellington. The casualty is attributed to extra jets of gas behind the canvas on the stage. It is long since we pointed out how such accidents might be prevented and valuable property protected, by rendering combustible substances, such as canvas and scenery, curtains, &c. nearly or altogether incombustible, by saline or other saturation.

NEW RAILWAY STATION AT WOLVERHAMPON.—Contracts for the erection of the station to be occupied jointly by the Oxford, Worcester, and Wolverhampton Company, the Shrewsbury and Birmingham Company, and Birmingham, Dudley, and Wolverhampton Company, have been taken, and the erection of the buildings, which will occupy twelve months, will be proceeded with forthwith. The site selected is on the road leading to Wednesfield. In front, the station will be 325 feet in length, and the platform within, which will be covered with a roof of glass and corrugated iron, will be considerably longer. The external elevation presents a central building in the Italian style, with extensive wings; terminated by pavilions, flanked at each end by out-offices, for general purposes. In the central building, the front of which will be 76 feet 6 inches, three doors will open into a vestibule, 36 feet 5 inches by 45 feet clear, in which there will be four booking-offices and staircases. The means of exit will be through passages, each 11 feet 9 inches wide, on each side of the central building. Blue bricks with stone dressings will be used.

ELECTRIC TELEGRAPH FOR RAILWAY TRAINS.—Capt. Wynne, a Government inspector, proceeded by express train last week from Euston-square to Birmingham, for the purpose of witnessing a trial of Professor Gluckman's invention for communicating between guards and drivers. Several signals, it is reported, were given by the guard, and instantly answered by the engine-driver. This was done while passing through various tunnels, during which time the noise of the train was considerable. It is estimated that the cost of attaching the apparatus to railway carriages will be about 17s. for each carriage, and about 2*l.* 10s. for the battery fixed in the guard's van and the bell apparatus on the engine. The idea of perplexing engine-drivers with the management of electric telegraphs while they ought to be attending exclusively to their engines does not seem to us to be a happy one at all, but perhaps the report is inaccurate in this respect.

LIGHTING OF CHURCHES.—In a paper lately read before the members of the Oxford Architectural Society, Mr. Skidmore thus referred to this subject:—What course would our forefathers have pursued had they possessed a medium for lighting so brilliant as that which has fallen to the lot of the present day? They would have so treated it as to render it a point of beauty in the adornment of the church. The fine effects produced in large churches by groups of small scintillations of flame producing a long vista of light leading eastward were then adverted to, and attention given to delicacy of hammered metal work for standards or other instruments by which the light would be conveyed to the building, treating them in harmony with the adherent nature of the material to be lighted. The construction of standards for isolated places, with wrought-iron supports analogous to the use of flying buttresses were enlarged on, as also the difference of treatment when attached to seats, and absence of any occasion when properly used for cutting away mouldings for the insertion of lead piping. The desirability of using foliage in the ornamentation suited to the part of the church for which they were intended was pointed out, and the vine and passion flower leaf cited as suited to the chancel, and other leaves, as those peculiar to the locality, to the other portions of the church.

MEASUREMENT OF BRICKWORK.—The suggestion made by your correspondent "Z." as to the standard of brickwork, I think deserves the serious consideration of parties connected with the building trade. In London the rod reduced is the general standard, and I believe the same custom prevails over many parts of the country. This standard is attended with the disadvantages that it is almost an imaginary quantity (I do not speak in the mathematical sense), and that it is difficult to use, in mental calculations, with any approach to accuracy. I am not aware, moreover, that there are any peculiar advantages attendant upon its use, beyond the sanction of custom. This custom has been deviated from in several instances by architects of repute; and I have reason to believe it is but little followed by civil engineers. The quantity mentioned by your correspondent, viz. the yard cube, would, I think, be preferable to the rod reduced; but as I am not advocating any particular quantity, I would suggest, if his recommendation should not meet with approval, the yard superficial of brick-and-a-half work. Either of these quantities would, I have little doubt, be more convenient than the rod, and they certainly could be more readily used in mental calculations.—T. J. P.

NEW STYLE OF SEPULCHRAL MONUMENT.—The *Birmingham Journal* of last week gives an account of some specimens of a new kind of sepulchral ornament, to which previous allusion has been made, and which consists in a combination of bronze electrotype with artificial stone. The bronzes are said to be good as well as cheap art-works, in which the crudity of mere castings is superseded by the closest impressions of the original sculptural idea, while the artificial stone affords a cheap mode of reproducing architectural or other details. The inventor is Mr. Potts, of Birmingham.

ARTESIAN WELL AT BRAINTREE.—The *Chelmsford Chronicle* publishes the details of a trial bore just completed at Braintree. The Local Board of Health, having a strong impression in favour of obtaining a supply of soft water on the Artesian principle, instead of the hard surface water from above the London clay, consulted Mr. Prestwich, the author of a recent work, "On the Water bearing Strata around London," and by his advice resolved upon making the attempt. At the depth of 245 feet from the surface, an apparently inexhaustible supply of water, said by ordinary tests to possess a considerable degree of softness, was got. The bore was made in a field adjoining Pods Brook, at an elevation, according to the ordnance survey, of 145 feet above the sea, being nearly 90 feet below the level of the highest part of the town. From a bore not exceeding 2 inches at the bottom, without any head or reservoir, but merely by introducing a common hand-pump, as much as twenty gallons per minute were obtained, and no exertions could reduce the level at which the water stood. The peculiarity of this trial is, the remarkable development of the mottled clays and sands between the London clay and the chalk. The well-borer, Mr. John Goode, of Great Baddow, stated that in thirty-five years' experience in various parts of Essex, he had never met with a similar thickness in these beds; and Mr. Prestwich remarked that, though by no means uncommon to the west of London, there were no previously ascertained data to lead him to expect such a thickness in these strata to the eastward.

LOCK-MAKING IN THE UNITED STATES.—The manufacture of locks appears to be rapidly extending. In an establishment at Pittsburgh, employing 350 men in making locks, coffee-mills, copying-presses, &c. good work was being turned out. Another at New Haven, Connecticut, employs about 200 men in making locks and lock-handles. The latter are made of coloured clays, so mixed as to present a grained appearance. They are first moulded by hand, then turned in a self-acting lathe with great rapidity, and are afterwards baked in a furnace. Padlocks are made here of a superior quality to those of the same class ordinarily imported from England, and are not more expensive.—*New York Exhibition Report.*

SUGGESTIONS FOR BUILDERS.—Perceiving that there is to be a new Metropolitan Buildings Bill, I beg to suggest that previous to any building being erected, proper drains and roads be made, and that all footings and brickwork to the height of 3 feet above the level of the surface of the earth, be built of vitrified bricks, thereby preventing any dampness arising; the same description of bricks to be used for all cellars, or underground work, and for more securely preventing noxious effluvia in houses: the earth in basement, or under the parlour floors, as the case might be, should be excavated 3 feet from such floors, then a layer of concrete be put in, and covered over with rough plate glass, thereby preventing any smell and vermin from annoying the inmates. It should be enforced that all air bricks for ventilation of ground-floors of houses should be at least 9 inches above the level of the earth. There are hundreds of new houses where the air bricks are below the ground. Bemarton-street, Caledonian-road, is an instance.

C. C.